JUNE, 1955 Vol. 44, No. 6

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

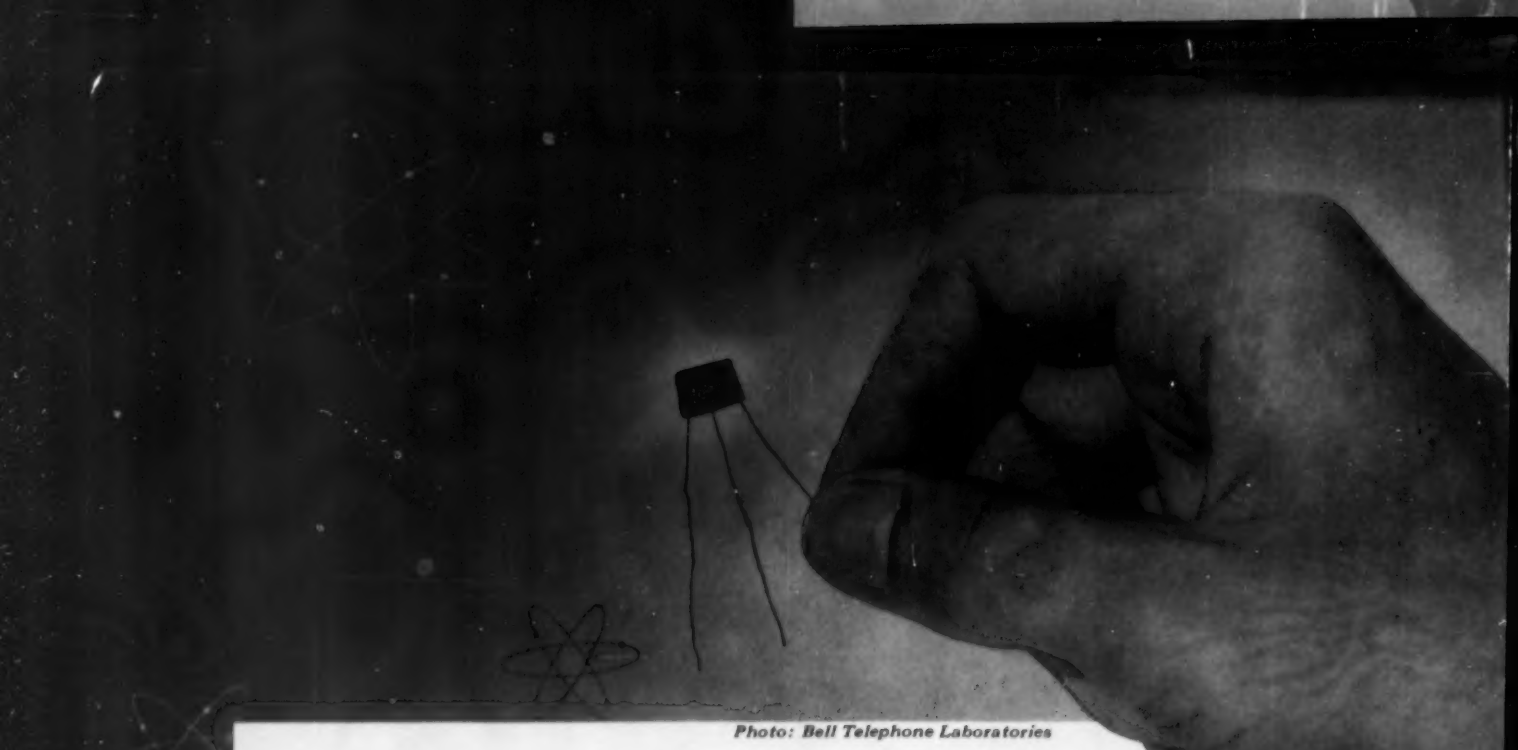

Photo: Bell Telephone Laboratories

FROM LITTLE THINGS

TREMENDOUS CONSEQUENCES

The transistor is a tiny bit of metal the size of a match-head. It has hairlike wires raying out from it. Not only small in size, it is trivial in appearance. Yet from its creation, its existence, its implications arises the prospect of tremendous advances in radio and television design, in the electronic "thinking machines" that now perform in minutes or hours calculations so complex as to require months and years of unremitting human effort.

From small things, tremendous consequences flow. Happenings in childhood, boyhood, too small to be noticed by uncomprehending adults may bend, warp, distort the youngster's life into despair . . . or again, may open a window to a vista of sunlight illuminating the clear path to success, to mental and spiritual development, to useful and rich careers. Conscientious educators know the importance of the seemingly trivial and wise instructors in mechanical drafting never make the mistake of belittling anything connected with their work. This is a subject that lies upon the broad avenue leading directly to engineering and science. Then why, they say, divert the youngster's attention, cool his enthusiasm, sap his sincerity by saying it does not matter what drawing instruments he uses? Why say that a few pennies pinched in their purchase can ever compensate for the opportunity lost to inspire the boy by the fine and inspiring quality and craftsmanship of a good set? The selection of drawing instruments may be but a moment in a long life, but the consequences can flow far into the future.

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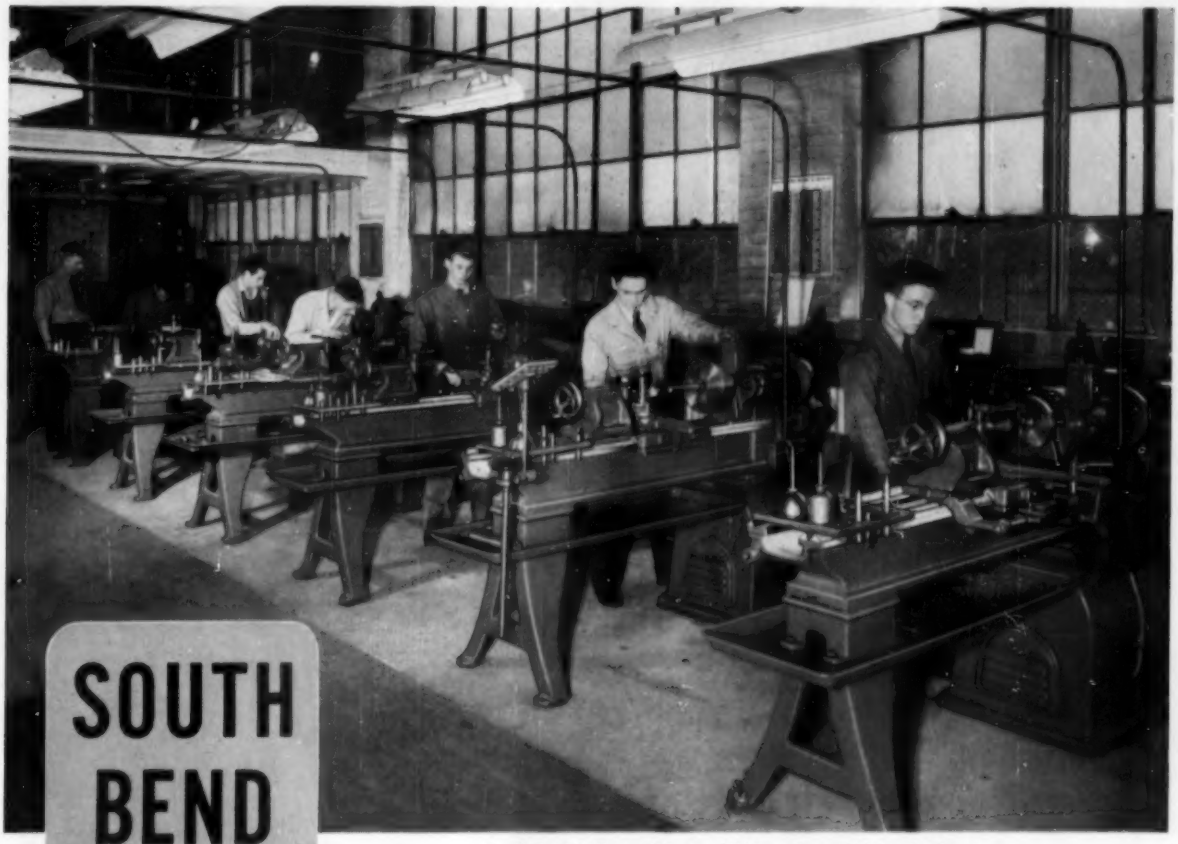

South Bend Lathes at Western Michigan State College of Education

SOUTH BEND LATHES

Suitability Has No Substitute

The ultimate yardstick of any shop equipment is its contribution to the effectiveness of a training program. It has to be practical — it has to be capable of the application of industrial techniques. Otherwise, the training students receive to help qualify them for positions of leadership in industry will be incomplete. South Bend 13" Lathes are a good example of complete suitability. Students will find exact counter parts in industry, as more South Bend Lathes are used by industry than any other kind.

Also, these lathes are extremely simple and easy to operate, adequately rugged to withstand hard use, and as "boy-proof" as it is possible to make them.

Mail coupon for complete information on 13" lathes and other quality-built South Bend Machine Tools.

NEW BOOK OF PROJECTS

SPECIAL OFFER TO SHOP INSTRUCTORS—34 graded projects each complete with drawings, bill of materials, step-by-step instructions. 104 pages, $2.00. Sample project book and companion book "How To Run A Lathe" (value $2.50) sent for only $1.00.

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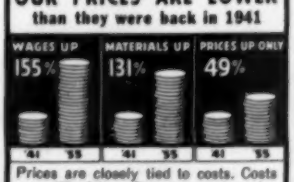

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

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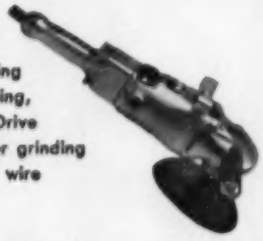
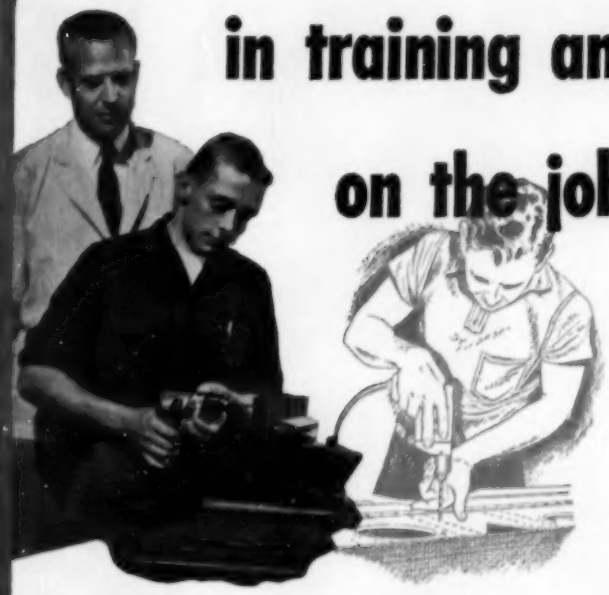


B&D Heavy-Duty Automatic Polishers train students to clean all types of metal surfaces. Cleans, polishes, seals in one operation. Light weight. Three models.



THERE is no better way to prepare a student to win his place in industry than to teach him with the tools he'll use on the job.

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Investigate these B&D Tools (and all the others in the B&D line). See your B&D distributor for demonstration—his address is listed in the telephone book Yellow Pages under "Tools-Electric." Write for free catalog. Address: THE BLACK & DECKER MANUFACTURING COMPANY, Dept. 2106, Towson 4, Maryland.

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JUNE
1955

VOL. 44 NO. 6

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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This Month's Cover

The cover picture of the June, 1955, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows a scene in the graphic-arts department of the Senior High School, Tucson, Ariz.

Photograph by Joe Ceasere of the graphic-arts department, submitted by Harry A. Goldstein, instructor of photography at the Senior High School, Tucson.

★ ★ ★ ★

Your Next Year's Address

It is again necessary to call to your attention the fact that if you are going to change your mailing address, at which you have been receiving the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine for the past year, that you notify us at once so you will not lose any of the 1955–56 issues of the magazine. Please let us have this information no later than August 15.

★ ★ ★ ★

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Association News

COMING CONVENTIONS

June 10–11. Georgia Vocational Association, at Biltmore Hotel, Atlanta, Ga. Secretary, Miss Nancy White, Macon Vocational School, Macon, Ga.

June 13–17. Ohio Vocational Agriculture Association, at High School, Wooster, Ohio. Secretary, Ward Lindenmuth, Germantown, Ohio.

June 20–24. Colorado Vocational Association, at Rockwell Hall, Colorado A. & M. College, Fort Collins, Colo. Secretary, Gladys Glendenning, 760 Bunting Ave., Grand Junction, Colo.

June 22–24. Pennsylvania Vocational Association, at Eagles Mere, Pa. Secretary, Dr. Richard Hartmann, 3810 Walnut St., Philadelphia, Pa.

July 24–27. National Audio-Visual Convention and Trade Show, at Hotel Sherman, Chicago, Ill. Executive Vice-President, Don White, 2540 Eastwood Ave., Evanston, Ill.

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Starrett TOOLS

Carefully selected on the basis of long experience with vocational education needs, these Starrett sets contain all the measuring tools needed for most shop projects. Compact, convenient, these kits are better for you, better for your boys. They are easier to store and issue, protect the tools, help prevent loss or damage . . . and right from the start they teach habits of care and neatness in handling fine tools. See them at your Starrett Tool distributor's . . . or write for Educational Folder No. 1202-CE.

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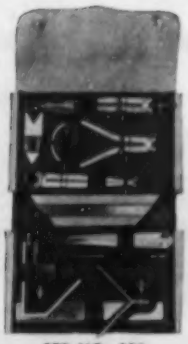

SET NO. 900

The basic tools at minimum cost. Contains 6" combination square complete, 6" flexible steel rule, center gage, center punch, 4" outside, inside and hermaphrodite calipers, 4" divider. Simulated leather folding case.

SET NO. 901

A practical, economical "package" — contains 6" combination square complete, 6" flexible steel rule in leather case, center gage, center punch, 5" divider, 6" outside caliper and 6" inside caliper plus The Starrett Book for Student Machinists — all in a sturdy, compact, nicely finished wood case.

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A.I.A.A. CONVENTION

The Seventeenth Annual Convention of the American Industrial Arts Association held at Atlantic City, N. J., April 27, 28, and 29, 1955, came to a close Friday evening with a banquet and the "Ship's" party.

The attendance was upward of 1000, and embraced administrators, teacher educators, city and state supervisors, teachers, and teacher educator students. Many states, Canada, Puerto Rico, and other U. S. Possessions were reported.

Approximately 55 firms displayed their wares at the convention giving those in attendance an excellent opportunity to inspect hand and power tools, drafting and scientific equipment, finishing materials and wood, metal, plastics, and other media used in the school shops.

The school exhibits were outstanding, well displayed, and the students from the various teacher educator institutions gave demonstrations that were very near faultless. The shopwork on exhibition also was well made and excellently finished.

The officers of this organization are to be commended for the excellent work that was done during the year in preparing for this convention. Especial credit should be given to Burl N. Osburn for arranging an outstanding program.

The general convention theme chosen for this annual meeting was "Art and Industry — Their Significance for Industrial Arts Education," and the programs of all sessions were closely co-ordinated with this theme.

The general meeting on Wednesday afternoon was presided over by Kenneth Perry.

Dr. Henry Herrmann in his address on "Art and Industry," emphasized that we must strive to make education not for the few but for all. Then we must help our students to translate the knowledge which they have gained in practice. By our efforts, we must aim to raise industrial products to the level of real industrial arts.

Olindo Grossi spoke on "The Expression of a Materialistic Culture."

The four discussion groups formed immediately after the two addresses, and discussed the topics of how industrial arts could give a realistic interpretation of industry; how to justify the term "Industrial" in our title; how to keep up with the new industrial developments; and how to deal with the concept of industrial developments.

At the general session on Wednesday evening, DeWitt Hunt talked on comparable state record forms for tabulating industrial-arts data.

Fred J. Schmidt gave an address on "Successful Methods of Recruiting Teacher Education Candidates," and M. Ray Karnes spoke on the accreditation of industrial arts teacher education programs.

Again discussion groups were formed to discuss further the topics just presented.

At the same time, an Epsilon Pi Tau meeting and banquet was held in the Senator Hotel.

On Thursday morning the general topic of increasing the use of creative intelligence in industrial-arts education was discussed.

Kenneth Perry presided at this session.

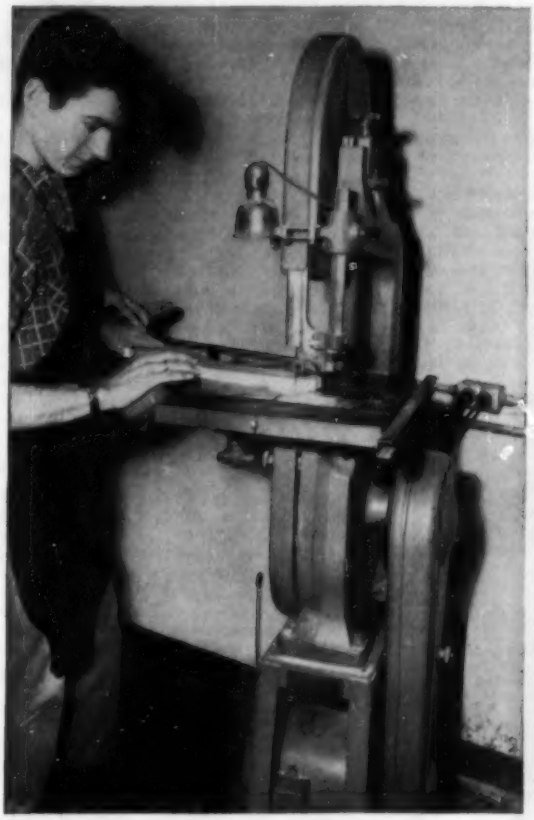
Dr. Henry Herrmann again spoke at this meeting. His subject was "The Psychology of Creative Learning."

He emphasized the idea that creative effort cannot be uncontrolled — there must be planning. It is in the school where the student must learn how to appraise and adjust himself to life.

The next speaker was Harold Brennan. He spoke on design as an expression of material, process, and structure.

Design necessarily must embody function, processes, structure, tools and material. De-

(Continued on page 6A)



Mr. Schmidt shows student how to feed stock on Delta 6" Jointer.

Student uses Delta 14" Band Saw to cut modern table leg.

Students can safely sharpen tools on completely protected Delta Tool Grinder.

Practically No Maintenance in 15 Years

on DELTA Power Tools at Mayville Central School

Rockwell-built DELTA Power Tools have been in day-in-day-out use for 15 years in the busy shop at Mayville Central School, Mayville, New York. "In all that time, our DELTA Tools have required practically no maintenance," says Mr. Robert P. Schmidt, Industrial Arts Instructor. "When you consider that literally hundreds of students use them, you can picture their ruggedness and year-after-year dependability."

In addition to DELTA'S dependable operation, Mr. Schmidt points out an even more important fact: "DELTA Power Tools are tops in *safety* and *ease of operation*." There are seven "veteran" DELTA Tools in use at Mayville Central: a 24" Scroll Saw; a 10" Tilting Arbor Saw; a 12" Lathe; a 14" Drill Press; a 14" Band Saw; a Tool Grinder; and a 6" Jointer.

When growing attendance at Mayville Central made it necessary to relocate the shop, "We used our DELTA Tools to make cabinets, work surfaces and storage facilities for our new location," reports Mr. Schmidt. "As the school continues to grow and new facilities are built, I'll recommend the purchase of more DELTA Power Tools."

You'll find it wise to recommend DELTA for your school, too. The safety, accuracy, ruggedness and remarkable ease of operation that make DELTA Power Tools the leader in industrial use, also make them the most practical for student instruction. See your DELTA Dealer, or send the coupon for full information.

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ASSOCIATION NEWS

(Continued from page 4A)

sign must also take into account the cost of material, markets, and use.

The speaker showed many beautifully designed pieces of pottery, metalwork, and weaving. The designer must see that the ideas that he presents must be able to be translated into actuality. Industrial-arts design should be improved greatly.

The discussion groups studied the general problem of how to increase thinking through pupil-teacher planning, how to increase taste, creativity — and educational experiences obtainable from designing.

Merrill Hamilton presided at the Thursday afternoon session.

At this meeting the place of craftsmanship in industrial-arts education was discussed.

Sterling A. Callisen chose for the subject of his presentation "How to Develop a Sense of Craftsmanship in a Mechanized World," and Dorothy Thornton explained how the museums aid the schools of New York.

She described how the exhibits and teachers aids are scheduled and moved from school to school.

The discussion groups then deliberated on craftsmanship and skill; the evaluation of exhibits and competitions; finding and using community resources; and the contributions of the industrial designer to the field of industrial arts.

Louis V. Newkirk presided at the Thursday evening meeting.

J. A. Fuzak spoke on recruitment; Paul Harrison, Jr., on the problems of the beginning teacher; and G. Wesley Ketcham, on educating the layman.

The discussion groups then deliberated on the material that had been presented by the speakers.

Gordon O. Wilber presided at the Friday morning session.

The role of manual arts therapy in the rehabilitation of disabled veterans was the subject presented by Edgar Best.

He emphasized the fact that manual arts are a valuable means in helping sick or maimed persons to regain their bodily and mental health and the use of their limbs.

It also gives exploratory experiences to these handicapped people and has put many on the road to earning their livelihood.

Mark Starr, in his talk on "What Do People Do with Their Leisure Time," outlined how workers today, due to union activity, have much more leisure time than ever before.

Kermit A. Seefeld then gave an excellent evaluation of the "Do-It-Yourself" movement.

President Gerald Baysinger conducted the general session and business meeting in the afternoon.

The new officers for the year 1955–56 are: president, Dr. Burl N. Osburn; first vice-president, Roy Radtke; second vice-president, J. Philip Young; and Dr. John A. Whitesel and Charles Dilks were appointed members of the executive board.

The American Council on Industrial Arts Teacher Education held their meetings on Tuesday and Wednesday, April 26 and 27.

Officers for the coming year are: president, Dr. John A. Whitesel; vice-president, Dr. J. A. Fuzak; secretary, Milo T. Oakland; and treasurer, Ivan Hostetler.

The American Council of Industrial Arts Supervisors also held their meetings on April 26 and 27. Their new officers will be elected by a mail ballot.

One of the outstanding events of this convention was the wonderful display of shop projects and the demonstrations put on by students of a number of the teacher education institutions on Friday afternoon in the Chalfonte Hotel.

Dr. Gerald Baysinger presided at the annual banquet Friday evening.

Arthur F. Hopper, former superintendent of schools, Plainfield, N. J., was the toastmaster. This affair was fairly well attended.

The main speaker was Dr. M. F. Ashley Montague. After the banquet session ended the Ship's party was held, with its entertainment and distribution of prizes.

The next convention of the American Industrial Arts Association will be held at Milwaukee, Wis., April 23–25, 1956.

AUDIO-VISUAL CONFERENCE

Audio-visual specialists and educators from a large radius assembled on The Stout Institute campus on March 29, for Stout's third annual audio-visual conference. The all-day sessions were devoted to "Teacher-Produced Audio-Visual Materials."

Keynote speaker for the occasion was C. R. Crakes, nationally known audio-visual specialist and educational consultant for the DeVry Technical Institute of Chicago. Mr. Crakes described the importance and techniques of teacher-developed audio-visual aids.

Presiding at the general session was Dr. Guy Salyer, associate professor of education at Stout. Dr. Verne C. Fryklund, president of the college, welcomed delegates.

Four sectional discussion groups were held. Dr. Richard S. Mitchell, director of the audio-visual center at St. Cloud State Teachers College, demonstrated "Giving Voice to Colored Slides." Harry Webb, audio-visual chairman for the College of St. Thomas, told delegates "How to Make Better Tape Recordings."

(Continued on page 12A)

NEW "DYNO-MITE" POWER WOOD BITS with high-speed steel blades. Stay sharp 10 times longer than ordinary tool-steel bits — even cut through wire nails and screws. Start readily even at angles. 6 sizes from 1/8" to 1". Separately or in sets of 4 or 6. Set No. 8006 shown. $6.45

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RIGHT-ANGLE DRIVE to fit all 1/4-inch electric drills with 3/8-24T spindles. Requires no adaptor — uses chuck of drill to which it is attached. Permits work in corners, between studs, in many spots where drill cannot be used direct. Gear ratio 1 to 1. Steel gears — grease-sealed lubrication — Oilite bearings. No. 2130. . . . . $4.95

NEW JIG SAW ATTACHMENT for all 1/4-inch electric drills. Cuts wood, metal, plastics, etc. Capacity 2" in wood, 1/8" in metal. Makes its own starting hole in wood. Automatic air blast keeps cutting line clear of chips and sawdust. Universal joint drive assures maximum power transmission. Complete with 2 metalcutting and 2 woodcutting blades. No. 2140. . . . $10.95

POWERFUL NO. 1814 "DYNO-MITE" DRILL Conservatively rated at 1.7 amps. Ruggedly built for dependable, long-lasting performance year after year. Palm-fitting pistol grip and straight-line trigger switch with automatic release. An outstanding value in every way. No. 1814 with Jacobs Geared Key Chuck. $22.35

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More and more instructors are adopting this practical, economical way to provide more power tool equipment for their students — at important savings in cost. Ask your supplier to show you these fine quality, high performance Millers Falls tools today.

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6" JOINTER

tops them all for School Shop use!

Note enlarged base, with convenient access doors. More weight. Improved dual-purpose guard allows operator to plane work ribbon-thin with complete safety.

HERE'S a brand new LIGHT-HEAVYWEIGHT — the Walker-Turner 6" Jointer that's literally made-to-order for school shop use.

In designing this latest addition to the line of popular LIGHT-HEAVYWEIGHTS, we've been guided by *your* ideas, *your* requirements, *your* experience. The result is this modern-designed, heavier 6" Jointer . . . Safety-engineered from the base up . . . to give you industry's standards of accuracy and performance . . . at a price to fit the school shop's budget.

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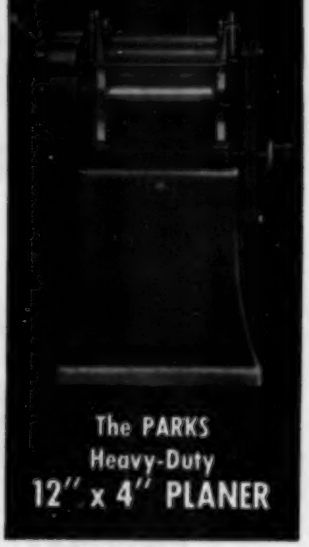

The PARKS
Heavy-Duty
12" x 4" PLANER

The PARKS WOODWORKING MACHINE CO., Dept. 24-C18, 1546 Knowlton St., Cincinnati 23, Ohio

This "Oliver" is the most complete Band Saw of its size!

The "Oliver" 18-inch motor-on-shaft Band Saw has many refinements and adjustments developed for the larger "Oliver" Band Saws. Table measures 24" x 20" — heavily ribbed, accurately machined. Tilts 45° to right. Has miter cross-cut gauge and parallel ripping fence. Takes 10" under guide, 18" between saw and column. Rips to 11" wide, miters and cross-cuts to 6½". A sturdy Band Saw, precision built to give years of service. Write for Bulletin No. 192-D.

"Oliver" Band Saws also made in 30", 36", 38" sizes. Ask for details.

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Side chair	Step table	Step end table
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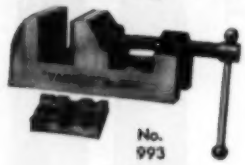

No. 993

No. 3993

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The "Yankee" No. 3993—2¾" jaws. Here's a practical angle vise for your machine shop. For quick set ups of work to be machined accurately at an angle. Jaws open to full capacity (3") at any angle. Grooved "V" block for holding rounds, etc., supplied with each vise; also made with detachable swivel base.

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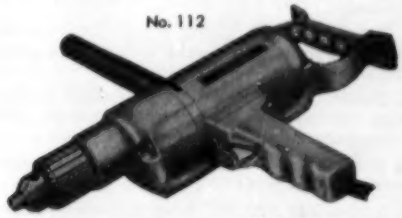
No. 112



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SUBJECT YOU TEACH or POSITION.....

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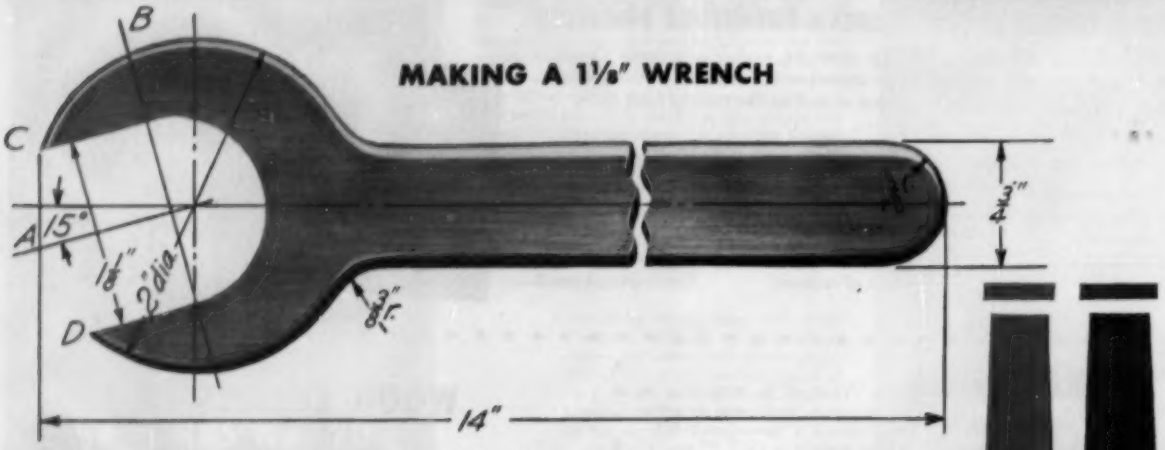
HOW-TO project for the School Shop

—by NICHOLSON FILE COMPANY

NO. 9 OF A SERIES

MAKING A 1⅛" WRENCH



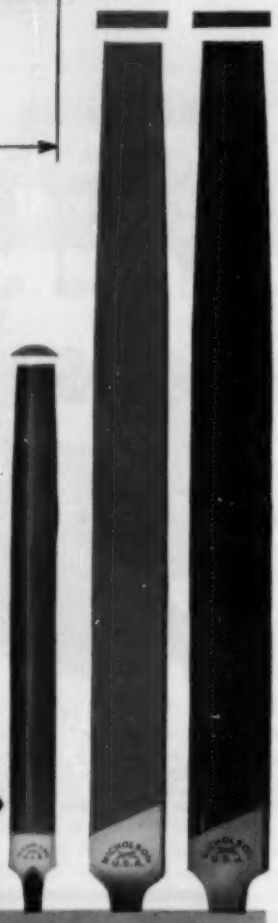
This exercise for the school-shop student illustrates, among other things, the efficient metal removal and precision results obtainable with Nicholson Mill, Flat and Half Round files.

Material: 1 piece 1/4" x 2" x 14" CRS.

Tools: Combination square, scriber, 3" dividers, center punch, protractor, 1/4" drill, hacksaw (approx. 24 teeth/"), layout dope, Nicholson 10" or 12" Flat, 10" Mill and 6" Half Round files in bastard cut, Nicholson 8" Half Round file in second cut, surface gage, 6" rule and hammer.

SCHEDULE OF OPERATIONS

1. File all burs from piece of steel and file one end square, using Nicholson 10" or 12" Flat Bastard.
2. Paint steel with layout dope. Draw center line through length of work with surface gage and 6" rule.
3. Construct line 1" from square-filed end of work and perpendicular to center line, using 6" rule, combination square and scriber.
4. With dividers, scribe 1"-radius circle at intersection of two lines.
5. Scribe line "A" 15° from horizontal center line with protractor and scriber.
6. Make light center punch mark 5/32" from center on line "A." Scribe line "B" through this mark, 15° from the vertical, using protractor and scriber.
7. At intersection of lines "A" and "B," scribe 9/16"-radius arc with dividers, ending at line "B."
8. Draw lines "C" and "D" 15° from horizontal, beginning at 9/16" radii on line "B."
9. With surface gage, scribe lines 3/8" above and below center line for handle.
10. Scribe 3/8" radii, with dividers, at handle end of work and at both intersections of handle with 1"-radius circle.
11. Drill series of 1/4" holes around inner opening and outside of jaw, allowing 1/32" for filing.
12. Saw out opening between holes, maintaining 1/32" allowance.
13. Saw out handle using long, even strokes—not much more than 50 per minute with a pressure of 15 to 25 lbs.
14. File flat jaws with Nicholson 10" or 12" Flat Bastard to 1 1/8" opening. Finish with Nicholson 10" Mill Bastard.
15. File inner and outer radii of jaw with Nicholson 8" Half Round Second Cut file blending radii with jaw opening. File 3/8" radii of handle with Nicholson 6" Half Round Bastard file. Roll files with each stroke for smooth finish.
16. File handle with 10" or 12" Nicholson Flat Bastard to layout lines.
17. Draw-file all edges with Nicholson 10" Mill Bastard, using chalk to obtain smooth finish.
18. Round edges of handle and finish draw-file flat surfaces with Nicholson 10" Mill Bastard.
19. Have instructor check work.
20. Case-harden or pack-harden wrench, depending on shop equipment.



Nicholson Half Round, Mill and Flat files in bastard cut are shown here approximately half size. (The Nicholson Half Round file in second cut is not shown.) Available also in Black Diamond brand, these files are among the most popular and commonly used in shop work. Widely obtainable through industrial supply houses and hardware dealers.

FREE REPRINTS OF THIS PAGE

for school-shop use will be sent to school heads or instructors on request. Please ask for "How-To Project No. 9," stating minimum number of copies required.

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
JUNE 1955

Education at Present, Needs —

Some Administrator Soul Searching

T. A. HIPPAKA
Iowa State College
Ames, Iowa

"The time has come to treat the nation's school administrators as a professional group." — New York *Times*.

We have arrived at a fantastic impasse in education. Never have school staffs worked harder than they are working today. Seldom, if ever, have educators done more for youth than they are doing for them today. Services to youth have been expanded beyond all expectations. We not only have large numbers of pupils in our schools, but the range of ability has increased. School buildings are literally bulging out at the seams. Teachers not only cope with too many large classes, but they must face a wide range of ability in each class. Individual differences are not only difficult to recognize, but in too many instances they cannot be met. Home and community responsibilities rightfully belonging to parents and laymen have been steadily loaded on the schools. In spite of the educator's willingness to assume literally countless responsibilities for youth, and in spite of research proving that by and large teachers are doing the best job that has ever been done in our schools, criticism runs rampant.

In too many instances it could be very well said that we are attempting to do too much with too little. Where this situation exists, we finally arrive at a point of diminishing returns. Even the fundamentals are taught poorly; students are not mastering much of anything. The satisfaction that comes from doing something well is no longer experienced by teacher or pupil. Students may acquire false attitudes toward various activities because they are inadequately taught. Pupils, as well as teachers, may spread their efforts over too wide an area when time is of the essence. A reasonable number of subjects well within the capacity of a capable teaching staff should be the rule. Not only must the teaching staff be effective, but teachers and pupils must have adequate equipment, ample space, and appropriate materials of instruction, in order to do justice to the subject. We are willfully inviting failure and further public criticism when we attempt to offer subjects for which we have neither teachers nor adequate equipment. When pressures are brought to bear upon us to do this very thing, we should possess sufficient stamina to successfully oppose such proposals. The time has come when administrators must blame themselves, at least partially, for the dilemma in which we are involved. We have permitted too many responsibilities to be foisted upon us which rightfully belong to parents and laymen in the community.

In too many instances, the teacher who makes things easy for the pupils is the person who is gladly retained on the staff. The instructor who sees to it that the learner gets what he is going to need in this world, and gets it by doing some sweating for it, is quite frequently the unpopular teacher. Too often, educators want students to have fun doing most everything, when they know full well that life is not all fun. Making a living is often plain drudgery. Since we have to do unpleasant things in this world, young people need to get some experience in this area as they attend school. Students should learn to get along with unpleasant people. In this rapidly changing world, people are going to have to burn some midnight oil if they expect to succeed in life. Life is not a picnic; it is serious business. It is indeed time we defended the teacher who is conscientiously preparing youth for a highly competitive world, and doing so realistically.

School staffs in their entirety must hang together in whatever they do, or more very excellent educators will hang separately. A school staff can become a highly respected and influential group in most any community if its members will work together and stay together. Administrators and teachers must realize that they are all rowing the same boat. As the administrators go, so fares the individual teacher; and as teachers prosper, administrators profit also. Staff-formulated goals will be reached to the extent that school personnel consider them vital

to the welfare of youth. Teacher-administrator formulated standards of attainment will be realized to the degree that teachers take pride in their work, thereby inspiring pupils to do their best. Instructors must all see to it that students work to capacity. Staff-formulated standards of behavior can become a reality only if teachers believe in them and influence youth to reach them by doing voluntarily what they ought to do. Without staff-formulated goals, standards of attainment, and standards of behavior clearly defined for students and teachers alike, there can be no uniformity of purpose. Without united effort in these areas, resulting in reasonable success in each, critics will increase in number as well as severity, making the future of educators even more untenable.

Administrators and teachers must possess group solidarity for a number of other reasons. Since America is a country of pressure groups, teachers must learn to bargain collectively. Whenever teachers improve their lot, the learners naturally profit thereby. Staff members working as a unit cannot be denied. More adequate school buildings, better equipment, more suitable materials of instruction, improved working conditions, more equitable salaries, and greater community status for teachers will come only through the concerted effort of educators. Group loyalty will not only assure educators greater professional security, but it will bring greater educational opportunity for youth. Teacher and pupil welfare are always inseparable; one cannot be had to any great degree without the other.

Whenever our schools are subjected to criticism, it readily reaches those who teach, as well as those who administer our schools. Teachers often bear the brunt of such criticism. Of course, they are not flawless and quite generally they recognize this. They too have shortcomings, and errors are made in our underequipped and overcrowded schools. It never was truer than it is today that no school is any better than its teaching staff. On the other hand, our atomic age is so complex that it takes more than "a log with the pupil on one end and the teacher on the other" to make a successful school. In other words, adequate building facilities, equipment, and materials of instruction are essential to the success of any teacher. While teachers should bear their fair share of the public criticism of our schools, administrators, too, must shoulder their portion of it.

If the administrator is doing his job well, he is creating and maintaining the kind of working conditions which permit the teacher to meet the needs of the pupils who come to him for instruction. Where he fails to perform these administrative duties creditably, teachers may be compelled to labor under insurmountable handicaps, thereby bringing even greater criticism upon the schools. On the other hand, there are times when teachers need to accept certain situations over which they or the administrators have little control, at least for the time being. However, teacher-administrator relationships can be such that the teacher has full confidence in the latter, knowing very well that any acutely disadvantageous circumstances will not be allowed to prevail for any great length of time.

The Need for Self-Evaluation

Since criticism is so prevalent in and around our schools, it would be well for administrators to do some honest soul searching as a means of reducing the vulnerability of our schools to constant attack. Self-appraisal is never an easy task. On the other hand, it is through self-evaluation that we see ourselves as others see us. To the degree that we succeed in doing so, we will be able to manage our schools as those about us would like to have them managed. In our self-evaluation we might well make the following a criteria for our soul searching:

1. Do we have a sound philosophy of life which others catch from us because we live it every day?

2. Do we possess a functional philosophy of education because we have acquainted ourselves fully with the needs of youth?

3. Do we command the respect of teachers, students, and lay people in the community because of our integrity, mature judgment, fairness, tact, and courage in meeting our daily problems, and in dealing with all kinds of people?

4. Do we constantly take pride in keeping our leadership qualities at a high level, in order that we may lead people into doing as they should; or, do we administer solely by virtue of the authority invested in us? Since the schools belong to all of the people, policies are generally group conceived; all of which places a high premium upon the administrator's leadership ability. We need to remember that in a democracy school policies, besides being group formulated, are generally subject to review, reflection, modification, and final acceptance by those affected thereby.

5. Do we possess approachability? In the first place, do we organize and execute our own duties in such a manner that we have time to see people? Do we display a genuine interest in the welfare of others? Do we assure them of their importance? Are we good listeners? Do we pride ourselves on being courteous and open-minded? Have we established the reputation of being fair with all concerned? People are impressed with our sympathetic understanding of their viewpoints. We turn a possible heated argument into a quiet discussion by appealing to the sense of fair play in others. We build them up while they talk. Thus we can still stand our ground without unduly antagonizing anyone. Instead of getting into an ill-conceived argument we can suggest that we both give the question further study. Through such procedures we widen the avenues of agreement, and narrow the area of disagreement. We build for ourselves a reputation of being people who get along with others, an asset so essential in our profession.

The Need for Good Public Relations

6. Do we carry our public with us? There are at least two occasions when we can get into difficulty with our public — when we are too far behind them in our thinking, or when we are too far ahead of their expectations. Only an informed public can become a helpful public. Bond issues generally fail when administrators neglect to gain the confidence of those who vote the money for school purposes. There are a host of other difficulties that arise when we disregard our public relations. Without agreeable public relations school progress comes to a standstill. Above all, financial support is not forthcoming. The public does not like surprises; people wish to be kept informed regarding school plans. When they are duly and adequately informed about any necessary staff proposals of a practical nature, they are generally ready to provide the necessary finances. In the final analysis, any policies formulated by the school staff must be sanctioned by the taxpayers. Policy authorization cannot be pre-empted from them. Since it is true that the administrator must assume the leadership in policy proposals, and since the ultimate decision rests in the hands of the citizens, it is sound procedure to secure the layman's co-operation early in the developmental stages of any school planning. The policy then becomes his because he has assisted in its formulation. We have educated him, and he has educated us along the way. The policy is his just as much as it is ours. He will vote for it, and that, of course, is what we want him to do.

7. As administrators, do we visualize the activities of the school or school system in their entirety, in order that the ultimate product may be a well-rounded person with breadth as well as depth?

8. In all of our citizen-staff planning do we impress taxpayers with the unique expertness needed by those who operate their schools? What is more, are we so everlastingly effective in our efforts that we continue to remain experts in the opinion of those

who entrust their youth to our guidance? As laymen collaborate with school personnel, there is a very real danger that they will minimize the expertness required to direct their educational system. The best way to arrive at such a sad impasse is to be lacking in common sense, tact, judgment, skill, and courage, as we go about our daily tasks. The proof is in the pudding. Whenever a student fails in our schools, we fail with him. In the eyes of this student's parents, we are not rated very highly in our expertness whenever their offspring disappoints them. On the contrary, if we have succeeded in doing something with a student which his parents could not do, we are quite certain to be labeled experts. This is a reputation which we must establish for ourselves and sustain as well, if we are to prevent parents from overexperting us.

9. Do we keep the entire school program in balance so that no particular teacher or department staff "runs away with the ball"? The more spectacular school activities can very well "steal the show" when administrators lack courage and common sense to insist upon moderation in all areas.

10. Do we allow ourselves to become mired in a morass of details so that we cannot see the woods for the trees? We need to employ the kind of people to whom responsibilities can be delegated with confidence. While minor details should never be ignored by us, there comes a time when attention to them must be judiciously assigned to appropriate staff members. The administrator then has more time and energy to devote to worth-while goals and the means whereby the entire staff may aid in reaching them. He has time, and we hope wisdom, to articulate the efforts of the entire staff in a common cause, where the whole can truly become greater than the sum of its parts.

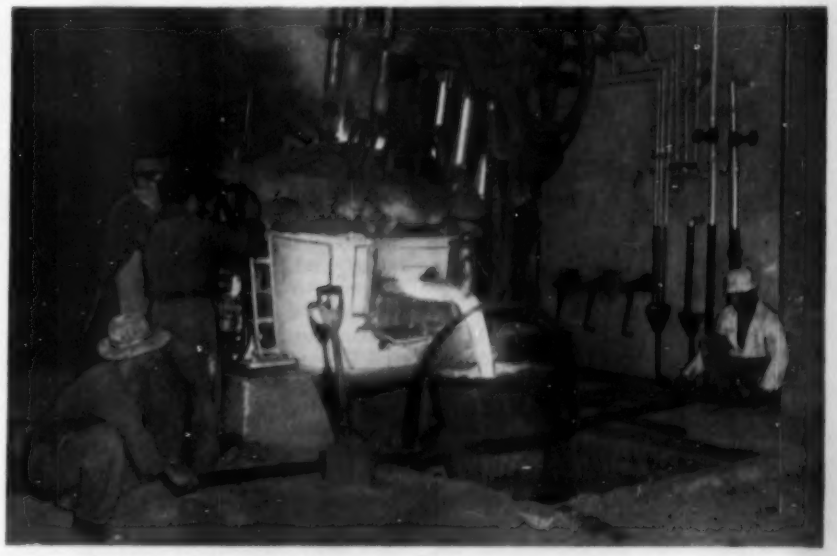
The Value of Advisory Committees

11. Do we protect the welfare of youth and fortify the efforts of our staffs through the appointment of advisory committees composed of civic-minded individuals? The importance of advisory committees is never to be minimized. They need to become a reality long before there are any serious community difficulties regarding our schools. A wise school administrator has a citizen's committee representing a true cross section of his community long before any school emergencies arise. The farseeing director of vocational industrial education fortifies himself with an advisory committee of representative taxpayers well in advance of any consequential difficulties in program operation. The facts in the case are that where such committees are wisely selected in good season, and where there is maximum co-operation between such committees and the school staffs, as well as school boards, grave school crises seldom arise. They constitute the sounding board of public opinion for the school personnel, if staff members will only use them as such. Furthermore, these committees generally prove to be the valuable connecting links between the schools and the community in order to assure greater harmony. In the best of regulated communities the citizen's committee never impinges upon the responsibilities of the board of education, nor does an advisory committee in a vocational program assume any of the responsibilities which rightfully belong to the board of vocational education.

12. Is budget making a co-operative endeavor between teacher and administrator? Teachers should be allowed to indicate their yearly needs in capital outlay. Inventories, purchases, and budgets go hand in hand. In formulating yearly budgets, teachers need to know price trends on supplies and equipment which they intend to buy for the coming year. Where staff members underestimate the cost of contemplated items to be purchased, there is trouble in store for them when bids are opened later. In other words, budget estimates must equal ultimate costs of supplies and equipment contemplated for the next school year. We may come out with an inadequate budget, a padded budget, or an honest one, which is also an accurate one. The latter should be the ultimate goal of teacher and administrator. Where cuts are necessary in a teacher's budget estimate, they should be made with a clear understanding between the administrator and the teacher, in order that the latter may govern himself accordingly. To assure equitable distribution of departmental funds, monies should be apportioned on the basis of pupil needs and not teacher aggressiveness. The payoff comes when the administrator appears before the board of education to justify his budget. It is then that he proves his worth to pupils and teachers alike, when through courage and his powers of persuasion his budgetary requests are sanctioned by the governing board.

Budgets and Requisitions

13. Is the bulk of our purchasing done on the basis of competitive bids solicited from interested dealers? Since we are responsible for making the taxpayer's dollar go as far as possible, it is imperative that we spend it in a businesslike manner. Staff members need to be taught how to prepare lists of supplies and equipment needed for the next school year. Any deletions or alterations in the original lists are made with a clear understanding between administrator and the teacher concerned. Purchasing should be done early enough in the spring so that delivery can be accepted by each teacher before he leaves for the summer vacation. Under such a plan teachers can look forward with satisfaction to the beginning of school in September, knowing that they have the wherewithal with which to meet their classes. Through competitive bids we get the best possible prices, always making a substantial saving in expenditures. What is more, smaller



The Central Normal School located near Lima, Peru, prepares men teachers for elementary, secondary, and vocational schools

Photograph submitted by Stuart A. Anderson, formerly technical director of vocational education, Institute of Inter-American Affairs, Lima, Peru; now director of teacher training and professor, Eastern Illinois State College, Charleston, Ill.

orders during the year have literally been eliminated. Administrator and staff members have worked together throughout this very important procedure in buying. They have agreed on best bids before they make their recommendations to the board of education. There are times when they have to prove to the board of education that the lowest bid is not always the best bid. It is then that their knowledge of supplies and equipment is put to a real test; they must be able to speak convincingly to a board of education, whose members may or may not know anything about the items under consideration.

14. When we purchase equipment for student use, do we practice common sense? It is sound economy to buy good equipment in the beginning, and to teach youth to give it proper care, and to use it wisely. Even good equipment becomes outmoded soon enough. The concept that most anything is good enough for the learner, is a false one. In fact, used, inappropriate, and obsolete equipment has often been wished upon youth when school staffs lacked the courage to refuse its installation. Young people are getting ready for a fast moving world, and they cannot do so on inadequate, makeshift equipment. If we are to procure the kind of equipment young people deserve, we must possess the ability to influence board members to release the necessary money for such equipment. There will always be low bids on inferior equipment, and it will demand courage and intelligence to prove to board members that the purchase of such equipment does not constitute sensible economy in terms of taxpayer's dollars, nor adequate provision for the future welfare of youth.

The Importance of a Good Accounting System

15. Do we have an adequate accounting system? Stewardship of public funds makes accurate accounting of the taxpayer's money imperative. Naturally he is interested in school costs; he wants to know what he is getting for his tax dollar, and this is as it should be. Administrators too, need to know school costs if they are to profit by the past, as they plan for the future.

16. Are we constantly aware of the needs of employers as they search for better prepared personnel? We who prepare youth for the world of work must keep the employers in mind as well as the prospective employees. We need to remember that approximately 80 per cent of our high school students enter some kind of employment after graduation. High school is their last formal school experience. They constitute the major source of the employer's potential labor supply, and it is our paramount business to help the employer and employee get together. If we are prone to sit in ivory towers, we are playing a losing game. Unless we know the demands of the workaday world, we cannot adequately prepare youth for entry into it. This means periodical visits to places where people work; it means a solid acquaintanceship with those who hire people; it makes imperative a knowledge on our part of the changes taking place in business and industry. Only then will we prepare the kind of young people employers must have. When we have done this we need not worry about our relations with them. What is more, school support will be forthcoming.

17. When we contemplate new building construction or plant alterations, do we carry our staff and public with us? Are consequential school construction needs made crystal clear to the community? Co-operative staff planning is important from the very beginning, for pooled thinking produces a better plan. Practicality and economy in planning are essential if we expect the public to accept our building proposals. The taxpayer has a right to expect maximum returns on his tax dollar for building purposes, and when he feels assured of these, he generally votes the necessary money for school construction, as well as for needed alterations.

18. Where serious shortages exist, especially in terms of teaching staff, school plant, equipment, and materials of instruction, do we keep the public informed regarding the disadvantages under which students and teachers labor? It is our inviolable obligation to make crystal clear to the entire community how their offspring is being shortchanged as they endeavor to secure an education. What is even more important than this, do we enlighten them adequately upon the steps we are taking in order to remedy the prevailing inadequacies? We are derelict indeed when we fail to meet these basic obligations.

Does Our Curriculum Meet the Needs of Youth

19. Whatever the curriculum, is our offering fundamentally sound? To meet the needs of youth, and to do it adequately takes preparation, intelligence, and courage. Any program can readily become a "busy work" program. Do we prepare ourselves intelligently with facts and figures, so that we can really present the needs of youth to our public? Do we have the courage "to stick by our guns" and to secure adequate school plant, staff, equipment, and supplies, in order that young people will secure adequate preparation to meet the problems of a rapidly changing world? We must admit that too often essential subjects are neglected because of equipment costs. As educators, we have often failed to convince our public that the indispensables cost money. We have done so largely through the lack of staying qualities as we faced our board of education and our public. Lacking this quality, we have resorted to the introduction of trivialities into our curriculum. It constituted an easy out, and we accepted it. Then there have been times when we failed to teach fundamentals when we already had the equipment with which to do so. We had failed to analyze the needs of our learners in the midst of a situation where we had the wherewithal to do it.

The Teacher and the School System

20. Is the total curriculum staff formulated? Any progressive teacher expects to have a hand in curriculum construction. He desires to outline his courses on the basis of his education and experience. Naturally he has ideas of his own on what should be taught in his courses, and that is as it should be. Where a number of teachers are teaching in the same subject field, they should constitute a standing committee in order to give the total subject area offering the continuity which it should have. The wise administrator employs teachers with these capabilities and allows them to proceed on their own initiative, correlating their efforts with teachers in other departments, as well as their own.

21. As we interview candidates are we specific about any and all vacancies for which we are employing teachers? When we proceed to hire staff members, do we present the nature of each vacancy with candor and clarity in order that every candidate knows the exact situation into which he is going, before he signs his contract? Naturally, a written contract satisfactory to both employer and employee is always an imperative, if people are to understand each other. At the outset, the teacher not only wants to know what his salary is to be, but he has a right to expect that the contract specifies with a reasonable degree of exactness the nature of his duties. Merely to be contracted as a teacher in the public schools of a community where he may be utilized in most any capacity does not satisfy most teachers. Contractual specificity is not only the right of every teacher; it affords him the kind of security which makes him a better teacher — a real force in the community. Nor are contracts to be conveniently broken. Instead, they are to be faithfully adhered to by all parties concerned, for a written contract is basic to the very life of a democracy. We need to remember that the greatest benefactors of satisfactory contractual relationships between the teacher and the board of education are the students themselves. Judicious employment of teachers is not securing the best teacher for the lowest possible wage while misrepresenting the

situation into which he will go. On the contrary, and for the sake of student and teacher alike, total honesty and not misrepresentation should prevail during employment talks. The teacher will then be a happier staff member when he proceeds with his work, while the students will be the real benefactors from the efforts of such a teacher.

22. Do we provide each teacher reasonable time for class preparation? A teaching load which allows the instructor sufficient time for class preparation is the right of every teacher. Administrators not only owe this to their staff members, but what is even more important, they are duty bound to provide each pupil with a well-prepared teacher. Without adequate time for preparation, the teacher's effectiveness inevitably diminishes, and youth ultimately pays the price for such inefficiency. It naturally follows, that where such time is allocated to the instructor, that he use it wisely in readying himself to make more effective demonstrations, as well as subject-matter presentations. Where the teacher is adequately prepared, disciplinary emergencies are reduced to a minimum. So are accidents where mechanical equipment is being utilized. Where we have an adequately prepared instructor, the purposeful, well-directed work of the students moves steadily forward with very few distractions and interruptions; thereby culminating in an effective, satisfying, learning situation.

So-called Production Work

23. Do we afford our teachers adequate protection from too many miscellaneous tasks which can very well jeopardize their effectiveness as teachers? Many a master teacher has lost his efficiency when such protection was lacking. These chores may very well come from within the schools, as well as from without the educational system. Not only are these jobs imposed upon the instructional staff, but they may very well involve the time and energy of students. The primary purpose of teaching is to teach, while the chief reason for pupil attendance in school is to learn. Within reason, we may very well accept certain projects of an educational character which are agreeable to teacher and pupils. There is much to be gained from such co-operative endeavor, where the purpose and activities are meaningful to school and pupil, and where the project legitimately fits into the class program of activities. Committee assignments need to be meted out to staff members sparingly and justly. There is no escaping certain routine jobs within the school, but they need to be the necessary ones. Certain community groups may wish to solve some of their problems by imposing certain tasks upon school personnel and pupils for the want of a better solution. Such proposals need to be scrutinized with care if teachers and pupils are to function as effectively as they should in their respective areas.

24. Are we fair in assigning equitable teaching loads to teachers? Naturally, we need to make certain that each teacher is teaching subjects for which he has had adequate preparation. Where he must make special preparation for a class, because he has volunteered to take it, he should be allowed special time for such a purpose. Not only should we bear in mind the number of classes each teacher has, but we must scrutinize their size as well. As any department accepts its share of the slower students, these weighted pupils need to be distributed evenly among teachers. The teaching load of any teacher should be thought of in terms of number of classes, number of daily preparations, number of students, range of pupil ability, and the number of weighted pupils assigned to each staff member.

25. If we expect staff members to counsel young people, do we provide teachers with the necessary time to get the job done? In the final analysis, the counselor must identify, analyze, and help the counselee overcome his difficulties — all of which takes time. There are very few short cuts in helping people to help themselves when they have problems. Guidance is a man-sized job in any school situation, and it cannot be considered as something that we merely add to the program of a teacher who is already heavily loaded with other responsibilities.

Helping Teachers to Grow

26. Are our teachers' meetings of real value to staff members in that they are inspirational, as well as informational — where we as administrators really prove the true worth of leadership in helping staff members to solve their problems?

27. Do we promote professional growth by encouraging teachers to attend educational conventions, workshops, and summer schools? Do we indulge in such worth-while activities ourselves?

28. Are we research minded? Do we constantly acquaint ourselves with educational research, and do we utilize what is new and good in education? There are times when we cannot only assist research workers, but possibly we can do some research of our own.

Those who serve the public can never expect total immunity from criticism, which will be unjust as well as just. Where erroneous criticism is uncovered, school administrators must possess the necessary courage to ferret out its source and to inform people of their errors. Where the criticism is legitimate we must accept it and mend our ways. Most of the time such criticism comes from very intelligent citizens whose loyalty to our schools is beyond question. Their criticism can be very helpful, and its importance must never be minimized. At all times, we must lend a most attentive ear to such school patrons, for it is the citizenry of any community who ultimately sanction school policies. Not only do they give school officials the go-ahead sign on school policies, but they are our employers. In the final analysis, they pay the taxes from which accrue the monies so essential to the operation of our schools. We need to recognize the obviousness of these relationships without undue fear of the taxpayer, or any semblance of frustration on our part.

A good offense is always better than a good defense. Our offense should consist of the best teacher-administrator conceived policies which it is possible for the staff to formulate. Prevention of criticism becomes our slogan and not merely building defenses to meet criticism, important as they may be. Total concerted staff action to execute functional school policies, where group loyalty is paramount, will not only prevent criticism from running rampant, but such an offense will very materially enhance our professional standing. Not until we have made the positive, preventative offense basic in our administrative procedures, and the defense approach secondary, have we a right to console ourselves with Benjamin Franklin's words:

> "We must not in the Course of Publick Life expect IMMEDIATE Approbation and IMMEDIATE grateful Acknowledgment of our Services. But let us persevere thro' Abuse and even Injury. The internal Satisfaction of a good Conscience is always present, and Time will do us Justice in the Minds of the People, even of those at present and most prejudic'd against us!"

If you are tired gathering up drawing crayons that your child scatters about, obtain an empty cigar box. You can coat it with a water paint from your youngster's collection. When dry give it a thin coat of fresh, white shellac. You can attach the box to the drawing board or table used by your child. — *Shellac Information Bureau.*

A 50-year-old naphtha launch, which was still in commission in 1951, recently was turned over to the Marine Museum at Mystic, Conn. — *Petroleum Newsnotes.*

Teacher Educators Need to Study Their —

College Industrial-Arts Curriculum

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In suggesting an undergraduate curriculum for industrial arts, certain factors influencing that curriculum should be considered. Some of these factors include certification requirements, placement calls, type of positions held by graduates, follow-up studies, opinions of supervisors, opinions of those who are engaged in the task of educating industrial-arts teachers, and requests from administrators employing graduates of this type of curriculum. However, in this paper, certification requirements will not be considered because of the wide variation in requirements from state to state.

Brief Summary of Studies

Studies were selected for review on the basis of the criterion or criteria used to judge the success of an industrial-arts instructor or of his curriculum. The following criteria were used in the several studies reviewed: supervisors' opinions, teacher-educator opinions, graduates' opinions, administrators' opinions, catalog summaries and the preparation of industrial-arts instructors now teaching. In reviewing the literature, no study was discovered in which comparisons using as a criterion "how much the student knows and is able to do" were made between instructors with varying undergraduate preparation.

Bauers[1] completed a follow-up study of industrial-arts graduates receiving the bachelor of science degree from The Stout Institute during the years 1946–49 and found their five most frequent problems to be: (1) organizing instructional material, (2) selecting suitable projects, (3) repairing school equipment, (4) performing odd jobs for administration and faculty, and (5) setting up facilities to accommodate students.

Seventy-three or 53.7 per cent of these graduates felt that maintenance of equipment was underemphasized in their preparation, and about one third felt that the development of skill was underemphasized.

One third of these graduates taught in general unit shops, one fifth in unit shops, and one fifth in general comprehensive shops. The remainder had combination assignments.

Bauers found that, of the total of 136 graduates, 14.8 per cent taught at least one class in science, 11.8 per cent taught at least one class in mathematics, and 7 per cent taught at least one class in social science.

Hippaka[2] after surveying 125 superintendents suggested a criterion of the following twenty items to be used for evaluating instructors: (1) appropriate use of supplies, (2) workmanlike use of equipment, (3) shop management, (4) personality, (5) teacher-pupil relationships, (6) effective co-operation with administrators and other teachers, (7) teacher-parent relationships, (8) teacher-industry-business relationships, (9) professional growth, (10) teaching methods and devices, (11) philosophy of educational, including general as well as industrial, (12) knowledge of technical skill in the subject field, (13) breadth of college training in industrial education, (14) cultural background, (15) experience in industry, (16) program evaluation, (17) program expansion, (18) guidance and health-mindedness, (19) pupil management and control, and (20) abilitv to direct extracurricular activities related to industrial education.

Giachino[3] asked supervisors and teacher educators to rank in importance a group of 95 success factors and found considerable discrepancy between the values attached to the various factors.

The first ten factors to which supervisors assigned the greatest value were:

1. Ability to stimulate and develop student interest
2. Judgment
3. Self-control
4. Health
5. Caring for equipment, tools, supplies
6. Fair-mindedness
7. Keeping a shop orderly and clean
8. Safety and first aid
9. Mental alertness
10. Ability to demonstrate manipulative operations

The first ten factors to which teacher educators assigned the greatest emphasis were:

1. Initiative
2. Caring for equipment, tools, supplies
3. Self- control
4. Friendliness
5. Enthusiasm
6. Acceptance of responsibility
7. Efficiency
8. Ability to demonstrate manipulative operations
9. Keeping a shop orderly and clean
10. Arranging shop equipment and working facilities

Skill was rated 27th by respondents from teacher training institutions and 47th by supervisors. The total list of items in this study numbered 95.

Silvius[4] identified and arranged in order of importance some 160 activities. These activities, after arrangement, were used to set up a series of industrial-arts teacher education courses.

Kjos[5] studied the activities of Colorado teachers. He discovered that they rated skill first in importance, as indicated in the table below:

TABLE I. Importance of Activities Concerned With Professional and Personal Development, as Rated by 34 Industrial Arts Teachers (After Kjos)

Activity	*Rating* 1	2	3	*Score*
Develop a command of the instructional units to be taught	25	9	0	59
Secure help from professional books and magazines	22	12	0	56

[1]All references will be found at the end of this article.

Activity	Rating 1	2	3	Score
Develop desirable teacher traits	27	5	2	55
Analyze teaching problems to arrive at a solution	20	14	0	54
Develop a philosophy of general and industrial-arts education in harmony with over-all school philosophy	22	11	1	53
Select teacher education courses for professional improvement	17	17	0	51
Secure industrial experience	19	13	2	47
Evaluate teaching outcomes	12	21	1	43
Participate in professional organizations	12	20	2	40
Conduct research on teaching problems in industrial arts	10	19	5	29
Prepare material for publication	5	17	12	3

Schad[6] developed a four-year industrial-arts education curriculum for the Virginia Polytechnic Institute. His requirements, by area, are included as a part of Table II.

Tate[7] analyzed the industrial-arts curriculum of 51 selected colleges and universities in the United States. After this analysis, he suggested a curriculum which is summarized in Table II.

Miles,[8] by the use of time ratios, reviewed the preparation of industrial-arts teachers graduating from 129 institutions. His recommendations were grouped in three areas and are listed in Table II.

Pawelek[9] made an analysis and an evaluation of certain common functional training characteristics of teacher preparation in industrial arts. His recommendations are included as a part of Table II.

Wall[10] developed a dual purpose industrial education curriculum at the college level. His recommendations are shown in Table II.

The information included in Table II is a summary of the five afore-mentioned studies. Any errors or inaccuracies are the responsibility of the writer and not the researcher cited:

Summary

TABLE II. Summary of Several Studies Semester Credits Required for Graduation in Three Areas: Academic, Professional, and Technical

Author	Academic	Professional	Technical
Schad	61	26	44
Tate	66	25	40
Pawelek[9]	50	42	39
Miles	49	43	39
Wall[10]	44	44	43

Table II also provides a comparison of three areas of the preceding five studies: academic, professional, and technical. The academic area would, of course, include such subjects as English, algebra, physics, etc. The professional area would include educational psychology, principles of secondary education, practice teaching, and similar courses. The technical area would include all shop and drawing courses. After considering the five studies summarized in Table II, and also the studies completed by Bauers, Hippaka, Giachino, Silvius and Kjos, the following recommendations — by academic, professional and technical area — are made:

Recommended Undergraduate Curriculum

The Technical Area

In the technical area, it is believed that each major should:

a) Complete at least 40 semester credits of shop and drawing courses.

b) Complete a technical major of 16–18 credits and, if possible, meet the requirements for a technical minor.

c) Build that major on a broad range of technical experiences.

d) Receive in all technical courses instruction on "Care of Tools and Equipment."

e) Present evidence of industrial-work experience.

The Professional Area

In the professional area, each industrial-arts major:

a) Should complete 26 semester credits, this total to include student teaching.

b) Should receive direction on how to "Develop Instructional Material." This preparation is recommended because such training was suggested in all studies reviewed.

The Academic Area

In the academic area, each industrial-arts major:

a) Should complete a total of 60 semester credits.

b) Should complete basic courses in mathematics, science, English and social science, with provision for a teaching minor in one of the afore-mentioned four fields.

BIBLIOGRAPHY

1. Bauers, Ronald R., "A Follow-Up Study of the Industrial Education Graduates Receiving the Bachelor of Science Degree from The Stout Institute During the Years 1946 to 1949." Unpublished Master's Thesis (Menomonie, Wis.: The Stout Institute, 1950).
2. Hippaka, Thomas A., "The Selection of Teacher Timber," *Industrial Arts and Vocational Education*, XXXV (September, 1946), 283.
3. Giachino, Joseph W., "An Analysis of the Success Qualities That Should be Emphasized in the Training of Candidates to Become Competent Teachers of Industrial Arts." Unpublished Ed.D. Thesis (State College, Pa.: The Pennsylvania State College, 1949).
4. Silvius, G. Harold, "Instructional Units for Professional Courses in Undergraduate Industrial Arts Teacher Education." Unpublished Ed.D. Thesis (State College, Pa.: The Pennsylvania State College, 1946).
5. Kjos, Oscar E., "Activities of Industrial Arts Teachers in Colorado for Instructional Units in Teacher Education Courses." Unpublished Master's Thesis (Fort Collins, Colo.: Colorado Agricultural and Mechanical College, 1949).
6. Schad, Joseph Albert, "Development of a Four Year Industrial Arts Education Curriculum for Virginia Polytechnical Institute." Unpublished Master's Thesis (Ithaca, N. Y.: Cornell University, 1950).
7. Tate, John Bruce, "An Analysis of Industrial Arts Education Curriculums in Fifty-One Selected Colleges and Universities in the United States." Unpublished Master's Thesis (Stillwater, Okla.: Oklahoma Agricultural and Mechanical College, 1949).
8. Miles, George William, "The Preparation of Industrial Arts Teachers in the United States and Canada." Unpublished Master's Thesis (Greeley, Colo.: Colorado State College of Education, 1950).
9. Pawelek, S.J., "An Analysis and Evaluation of Certain Common Functional Training Characteristics of Teacher Preparation in Industrial Arts." Unpublished Ph.D. Thesis (State College, Pa.: Pennsylvania State College, 1941).
10. Wall, Gustave Sulo, "Dual-Purpose Industrial Education at the College Level." Unpublished Ph.D Thesis (Minneapolis, Minn.: University of Minnesota, 1951).

A student working on a milling machine at the Central Normal School located near Lima, Peru. Here teachers for elementary, secondary, and vocational schools are prepared. The U. S. Government is co-operating with the Peruvian Ministry of Education in the construction and organization of this new teachers college

Photograph submitted by Stuart A. Anderson, formerly technical director of vocational education, Institute of Inter-American Affairs, Lima, Peru; now director of teacher training and professor, Eastern Illinois State College, Charleston, Ill.

To Keep Up-to-Date, the School Must Study the —

Trends on the Educational Horizon

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It is trite to repeat that we live in an age of power, speed, and rapid change — almost cataclysmic change. The current age frequently referred to as, *The Atomic Age* becomes frightening, as one pauses to reflect on some of its possibilities and probable consequences. These changes, however, are largely of a scientific nature. They are the result of man's ingenuity and creative aptitudes and abilities, which have resulted in scientific discoveries and the application of these new discoveries to industry.

As one visits our schools, today, and observes palatial buildings and modern equipment plus enormous gymnasia, athletic stadia, and tile swimming pools, together with other expense paraphernalia, the thought arises frequently "but what about the end product?" The end product being the student who is being trained for an era which is vastly different than any man has known heretofore. Among the teachers who should be particularly disturbed relative to the educational programs in our schools are the shop teachers. Is their training program in conformity with contemporary needs? An array of broom holders, towel rollers, taborets, buzzers, tin cups, and the drawing of pseudo blocks and joints certainly does not conform to modern science and an atomic age.

The Occupational Situation

As one reads and studies job trends and technological advancement it is easily discernible that significant changes are taking place in our population, in the labor force, in production, and income. All of these factors will affect education. For example, currently our population (1954) exceeds 160,000,000 with an estimated rise in excess of 200,000,000 by 1975. The labor force today is approximately 68,000,000 with a potential of 88,000,000 by 1975. The current annual production of our agriculture, business and industry approximates $375,000,000,000 with a potential of $700,000,000,000 per year by 1975. The average family yearly income today approximates $2,000 with an estimated rise to $3,200 in 1975; together with shorter hours and higher wage rates. In addition, daily births of 11,000 exceed deaths by 7000. Furthermore, there are significant changes and trends in the employment situation. The demand for unskilled labor is rapidly decreasing while the demand for semi-skilled workers, skilled craftsmen, scientists, engineers, teachers, physicians, and other professional workers is increasing.

The current labor situation raises such questions as: (1) What occupations are increasing and what are the probable future demands? (2) What industries are expanding or growing obsolete? (3) In view of the atomic age and scientific expansion, should one acquire a general education or a narrow specialty? (4) In view of the consolidation of business and industry should one try to establish his own business or seek employment with one of the large established concerns?

Recently, the writer was a guest on a 20,000 acre wheat and cattle ranch in the Pacific Northwest. The present proprietor is the grandson of a pioneer, who, as a boy of 17 years, walked barefoot from Missouri to homestead in this particular section of the country. Upon his arrival, the stand of grass was shoulder high, but as grazing declined wheat became the staple crop and all work was done by the use of horses and mules. Today, such farm animals have completely disappeared and all farm work is mechanized. When the question was asked, "What opportunity for beginning farming would a raw recruit have in this part of the country today?" the answer was "practically none, because from $100,000 to $200,000 would be required to purchase the necessary farm machines and power equipment alone." This is indicative of the difficulties involved in trying to enter agriculture in the wide open spaces of the far West. The successful large scale farmer today is a scientist, a skilled craftsman — engineer and a business executive. On the industrial side of our economy it has been estimated that an expenditure of as much as $25,000–$50,000 is required in tools and power driven machinery for each worker employed in our major industries. Consequently, as business grows bigger and more complex there appears to be fewer opportunities for an individual to begin a business or industry of his own and meet with the same success, as was possible a generation or two ago. This does not mean that individuals should be discouraged from trying to develop their own business; but simply that more capital is required today and probably more business acumen and scientific *know-how*.

Recent reports show that the demand for brawn is declining while the demand for workers with more education is increasing. The demand is greater than the supply for executives, scientists, engineers, teachers, physicians, surgeons, and research workers. Skilled craftsmen are retiring and dying faster than they are being replaced. As our technology increases a premium is placed on talent and opportunity which requires specialized training. One writer sums up the situation by saying "Each generation can look forward to jobs that not only pay more in real purchasing power but also give expression to the higher qualities of mentality, as distinguished from the drudgery of unskilled manual labor."

An Educational Paradox

As technological progress grows the demand and opportunity for those who possess talent and special training increases. Naturally, it also increases the need for more education. The engineering profession offers an excellent example. At the turn of the century the ratio of engineers to other workers in this country was one in three hundred. Today the ratio is one engineer to every sixty workers. This, despite the fact that with only 7 per cent of the world's population in the United States we produce more than half the world's goods. In addition, it is estimated there are only about 475,000 professional engineers in this country and that a shortage of at least 40,000 exists. Last year our technical schools graduated less than 20,000 engineers but 6000 faced the draft. It is also estimated that at least 30,000 engineers will be required annually for many years, with an assured beginning salary of $4,000. It would seem, therefore, that our high school students would be anxious to prepare themselves for job opportunities which appear so promising. But such is not the trend. The outlook in the skilled trade occupations is even worse than in engineering.

If high school graduates desire to enter skilled trades and the technical professions it will be necessary for them to pursue subjects in high school which will permit them to enter training programs for these occupations. The facts, however, are very discouraging. Last year, according to one of our chief industrial recruiters only 1.4 per cent of high school students took solid geometry, only 1.6 per cent took trigonometry, 0.5 per cent took college algebra — in fact less than 20 per cent of our high school population pursued mathematics beyond arithmetic. Less than 7.6 per cent took chemistry and only 4.3 per cent selected physics. In other words, the demand for skilled workers, scientists, and technicians is increasing while the potential supply is decreasing. For many occupations, the need for a good mathematical foundation was never greater than it is today. It is the mathematicians who are charged with the responsibility of determining the materials that will be inserted into the electrical brains and other complicated electronic devices of the future.

Industries of the Future

Recently a new word has been added to our vocabulary — *automation*. This means the introduction of the automatic factory. An industrial plant where raw materials are fed into one end of a machine and the finished product is delivered at the opposite end. A colleague reports that such a machine is near perfection to manufacture electronic tubes, and for the first time these tubes will be manufactured without being touched by the human hand. While industry is still on the threshold of the atomic age, the first atomic-powered submarine has been launched and completed. It is predicted that within a decade all major seagoing vessels will be propelled by nuclear reactors, which means coal and oil as fuel will be obsolete. In addition, many raw materials which are growing scarce will be extracted from ocean water. No doubt inexpensive methods will be discovered for purifying sea water for human consumption and irrigation purposes. Other great technical advances are the ever growing business machines, whose complexity almost defies human description or understanding. It is predicted that harnessing solar energy offers another large area in the field of power. Scientists tell us that by 1964 we may expect "atomic canning, more prefab houses and buildings, home air conditioning, heat pumps, all kinds of Fiberglas products, much more of the synthetics, 3D color TV, more leisure and recreation, much more travel, particularly by air and helicopter, automatic machinery of every kind, more electronic controls, great cross country pipe lines and conveyor belts, more use of radioactive isotopes."

That many startling changes will occur very soon, which will have a great effect on daily living, is evident by a current news release from Stanford University. The latter announces the construction and inception of a new microwave laboratory. Among future devices predicted in the development of microwaves will be, to see a man's image on a screen during a telephone conversation, to tune in on TV with stations in foreign countries, to cook a steak by pressing a button and without the use of a heat flame or glowing wires. While an individual can use or consume only a limited amount of mechanical devices, food, clothing, and shelter, there are bound to be increases in such activities as health, recreation, travel, education, entertainment, due to a higher standard of living and shorter working hours. The solution to problems of the future is difficult, but since the school is the only social agency which reaches everyone, it must assume a major portion of this social responsibility.

The School's Role of the Future

As society progresses it is evident that our public schools must play a larger role in solving social, economic, educational, recreational, and occupational problems. Teachers of the future must be people with greater ability and imagination than those of the past or present. Educators must be leaders rather than followers. In the past educational philosophy has preceded practice by many years — sometimes hundreds of years. This situation must be reversed, if the schools are to keep

Franklin Derris and Lawrence Warrner working on a carburetor, in an auto mechanics class at the Tucson Senior High School, Tucson, Ariz.
Danny Sanchez, photographer. Photograph submitted by Harry A. Goldstein, instructor of photography, Tucson Senior High School

pace with scientific progress. The occupational guidance services in our schools must be overhauled and much more attention must be given to the selection and training of young people, who are capable, ambitious, and creative. It is utterly senseless and useless to try and fit all young people to the same educational pattern. Prior to the time when secondary school students approach the age when they are eligible for working permits, counselors should develop an occupational plan for each student assigned to them. No one should be permitted to leave our schools without, at least, a tentative life plan. In fact, a different type of secondary school is sorely needed, if education is to serve our adolescents effectively and efficiently.

It is comforting to those of us who are engaged in the practical arts activities to hear Ray H. Sullivan, a Ford Motor Company vice-president say, after viewing a group of 5000 entries in The Ford Motor Company Industrial Arts Awards Competition:

"We all know how far creative handskills fell into disrepute in the early days of the industrial age. Arts which had filled the creative needs of men and women throughout history fell under a social stigma. The mark of a gentleman or lady was the lily-white, uncalloused and unskilled hand. Many of my generation could not even drive a nail.

"Today I believe we stand at the threshold of a 20th Century renaissance of arts and handicrafts. Starting at the nursery school level the strong creative drive of our children is being carefully developed. More and more in our primary and secondary schools, fine and industrial arts are being taught with a view to strengthening that creative instinct, rather than smothering it under an excess of discipline and routine. We are teaching our young people not merely to imitate what exists, but to improve upon it.

"New developments in science and industry, new materials, new ideas of design, all have stirred the imagination of Americans and set us upon the road to becoming a nation of artisans.

"Of course many thoughtful Americans have worried about the consequences of an industrial society which is slowly but surely creating more and more leisure time for all the people. If we learn to use that leisure wisely we will enjoy a rich, secure life such as the world has never known. And it seems to me that the answer to the problem of leisure lies precisely in this trend toward a return to skills of hand and brain.

"Educators, particularly those of you who are directly concerned with the industrial arts, have long recognized this need and fought hard and well in the cause of industrial education. Perhaps industry has been a little slow in recognizing its own stake in this matter and in giving you the kind of support which will enable you to do the job which needs to be done. But I sincerely believe that day is drawing to a close, and that you will more and more get the support and co-operation which your efforts deserve."

In conclusion, it is self-evident that change is inevitable in a dynamic social order such as ours. Therefore let us as teachers approach the future without nostalgia for the old or awe for the new.

Making Drafting What it Ought to Be —

Functional Drawing at Evanston Township High School

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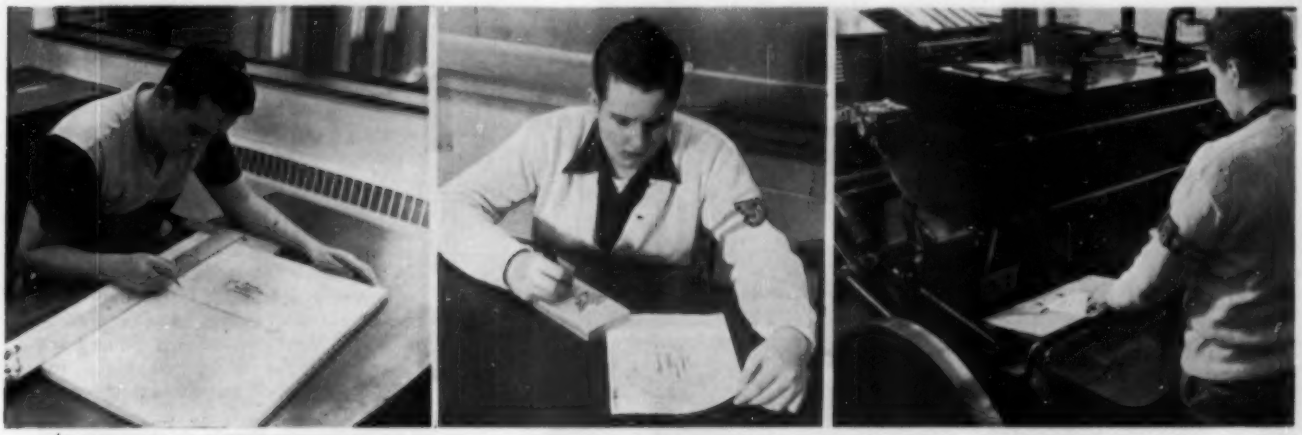
Recent magazine articles have told of the limitations of drawing as taught in many of our present-day secondary schools and of the need for revising courses to meet better the individual needs and interests of students. At Evanston Township High School we believed that certain changes in our beginning drawing courses had to be initiated if our program was to be educationally sound. This article has been prepared to tell about the methods we are currently using to provide functional-drawing content which we believe has utilitarian value for all students.

Because we believe that no two boys have the same needs and interests, we think that a program cannot be educationally sound if all students are required to learn mainly those basic skills and techniques which are required of the draftsman. Surveys which have been carried out in various locations show that the majority of students who take beginning high school drawing never work in occupations which require a knowledge of such skills and techniques as are emphasized in many schools. Even students who eventually work in the trades in actuality rarely find themselves in positions which require that they turn out accurately scaled drawings. We believe, therefore, that we can do considerably more for our boys if we can give them functional learnings which have general application and which can be used in both present-day and future living.

The beginning drawing courses at Evanston Township High School fall within two general categories. In the exploratory course, which is available to freshmen, students spend nine weeks each in drawing, woods, metals, and graphic-arts areas. In the second beginning course, sophomores, juniors, and seniors electing drawing for the first time spend one period daily in the drawing room for the entire academic year.



The above sequence of pictures depicts a student in various stages of planning and carrying through to completion a project in the freshman exploratory course at Evanston Township High School

The first picture shows the student in the drawing room working out a design for a Christmas card

In the second picture, taken in the graphic arts laboratory, the boy makes one of the linoleum block cuts which will be used in printing the cards Picture three shows the student printing his Christmas cards — E.T.H.S. photos

Exploratory Drawing Course

The major objectives of the drawing phase of the exploratory course are: (1) to provide students with opportunities which will help them to discover individual interests and aptitudes for living and working in a technological age, (2) to provide students with a knowledge of the drawing tools, processes, and materials which are utilized in the production and consumption of industrial products, and (3) to provide students with vocational guidance information.

It can readily be seen that for the short span of nine weeks an exploratory course of this type must be well planned in advance in order to utilize available time in the best possible way. Eight major areas were selected for the course, and information sheets and problem sheets worked out for each area. A wide variety of drawing books and other instructional materials are used to supplement the information and problem sheets. We have attempted to make all areas as flexible as possible to meet better the individual needs of pupils and to provide for an optimum amount of teacher-pupil planning.

The first unit, dealing with an introduction to drawing, consists of a pupil-teacher discussion of the relationship of drawing to present-day living, and of the way drawing can be useful to people in virtually all occupations.

Freehand sketching has been included because we believe that students should be shown that the ability to sketch can be extremely useful to them in high school and in later life. Certainly no one will deny the fact that sketches can be made much more quickly with a minimum of equipment than can drawings made with tools and instruments.

Freehand sketching techniques are utilized further in the following unit, in which pictorial sketches are made of objects seen and used in daily living. Students clip pictures or drawings from magazines and newspapers of objects which they desire to sketch. Such objects as television sets, kitchen stoves, refrigerators, lamps, and houses are sketched following isometric, oblique, and cabinet techniques.

The teaching of working drawing procedures in the eight to ten days which we have allotted for this phase presents the problem of dealing with a wide range of learnings in a short span of time. We fully realize that learnings will be superficial, for the most part, but by using a number of visual aids and presenting carefully prepared lectures and demonstrations it is possible to cover with exceedingly good results such aspects as drawing tools and instruments, orthographic projection, alphabet of lines, and dimensioning. Simple objects used in everyday living form the basis for working drawing problems, with students choosing from a variety of objects which have been drawn up pictorially.

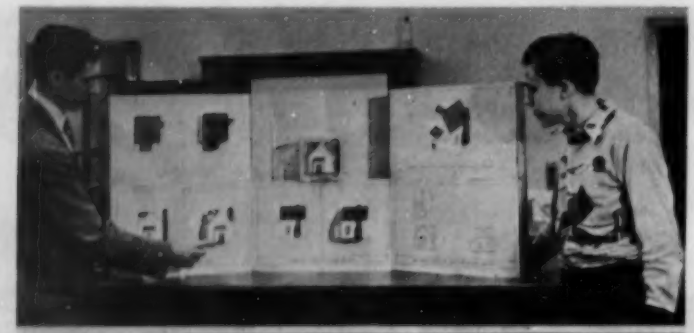
Maps and Graphs Provide Functional Learnings

A unit on graphs has been included in the exploratory course because of the extensive use which newspapers, magazines, and books make of these media for communicating facts and figures in comparison for rapid understanding. Pupils draw line, bar, circle, and pictographs from a wide variety of available statistics, or from sets of statistics which they have brought to class. Individual interests serve as the basis for such selections, with persons having a free rein to select anything of current interest to them.

The inclusion of work with maps and charts in most drawing courses in the prewar era was a rarity. The relative ease with which such graphic media can be adapted to drawing courses, through the use of either freehand sketching methods or instrument drawings, and the direct relation they have to everyday living, serve to make them highly justifiable for inclusion. During World War II maps were used to a great extent by all ground, air, and sea units, making it necessary to teach map reading to a large percentage of servicemen. The ability to read and interpret maps intelligently is especially important during current times to high school youth who face the possibility of entering military service after high school graduation.

A wide variety of both military and civilian maps and charts are used to implement the teaching of this unit. Students select geographical areas they are interested in and make maps of any type they choose. The nature of such units, with pupils working entirely on an individual basis, makes it mandatory that pupil-teacher planning be carried out to the greatest possible degree. An example of how such planning works out is exemplified by the case of the boy who was interested in making maps from aerial photographs. It was possible to secure a number of aerial photographs from the commandant of the school's military training corps, with the result that map making of this type has proved to be extremely popular.

The following unit involves the working of blueprint problems. We believe that all students, regardless of the occupations they may engage in after high school, should be able to interpret and understand the drawings they will use both in a consumer capacity and in



Upper: Visual aids which have been worked out for teaching view relationships are shown. The wood house models, accompanied by corresponding views, and the house model in the plastic projection box, are examples of the use which can be made of realistic objects of a type used in daily living

Lower: The automobile body and chassis drawings designed by the student are intended for entry in an automobile manufacturer's car design contest. This is an example of the type of work done in the general unit drawing course by students electing to work out things of interest

— E.T.H.S. photos

direct relation to carrying out the requirements of their vocations. Therefore, it would seem logical that work in blueprint reading could do much toward helping to bring about such desired ends.

Conventional blueprint reading problems have tended to center mainly around tool or machine parts. Such parts, no doubt, can be used to good advantage as blueprint reading or drawing problems in certain types of advanced high school, college, or technical school drawing courses, but have little or no meaning to freshmen who have had very little previous experience with such objects. We have attempted to work out problems which are meaningful to young people and which can be more readily understood by them. Examples are problems based upon layouts of fields and courts used in athletic contests, play situations in various games, and simple, easily recognizable projects made from wood, metal, plastic, and other basic materials.

Planning, the final phase of the exploratory course, ties in the learnings which have been achieved in the preceding units, and gives practical application to such learnings. Students begin by making working drawings of simple projects which they will eventually construct in the woods, metals, and graphic-arts phases of the course. Such action serves to overcome one of the major criticisms of many drawing courses in which the drawing is the end in itself, and whereby students are not provided with the opportunity to achieve an over-all picture of the constructional process from the basic idea through to the finished product.

The initial projects constructed in the three subsequent areas of exploration are basically the same for all pupils, although the educationally sound criticism of requiring all students to make exactly the same things is overcome to an extent by having them work out original designs for the basic projects. It is obvious that in a course where time limitation is a prominent factor, it is impossible to overcome a certain amount of standardization.

Students design and work out plans for things which are of interest to them after working drawings have been completed for the basic projects. Some boys prefer to make additional plans for metal, wood, and graphic art projects, whereas others may prefer to design such things as simple floor plans and other simple forms of architectural drawings. Tracings and reproductions made of all drawings which are to be used in the shops, with each student making at least one black on white and one blueprint.

We have said that one of the major objectives of the drawing phase of the exploratory course was to provide students with vocational guidance information. Such information is disseminated at convenient points throughout the course, and is achieved further through setting aside one period each nine weeks at which time vocational guidance films on engineering and drafting careers are shown, followed by a teacher-pupil discussion concerning such occupations.

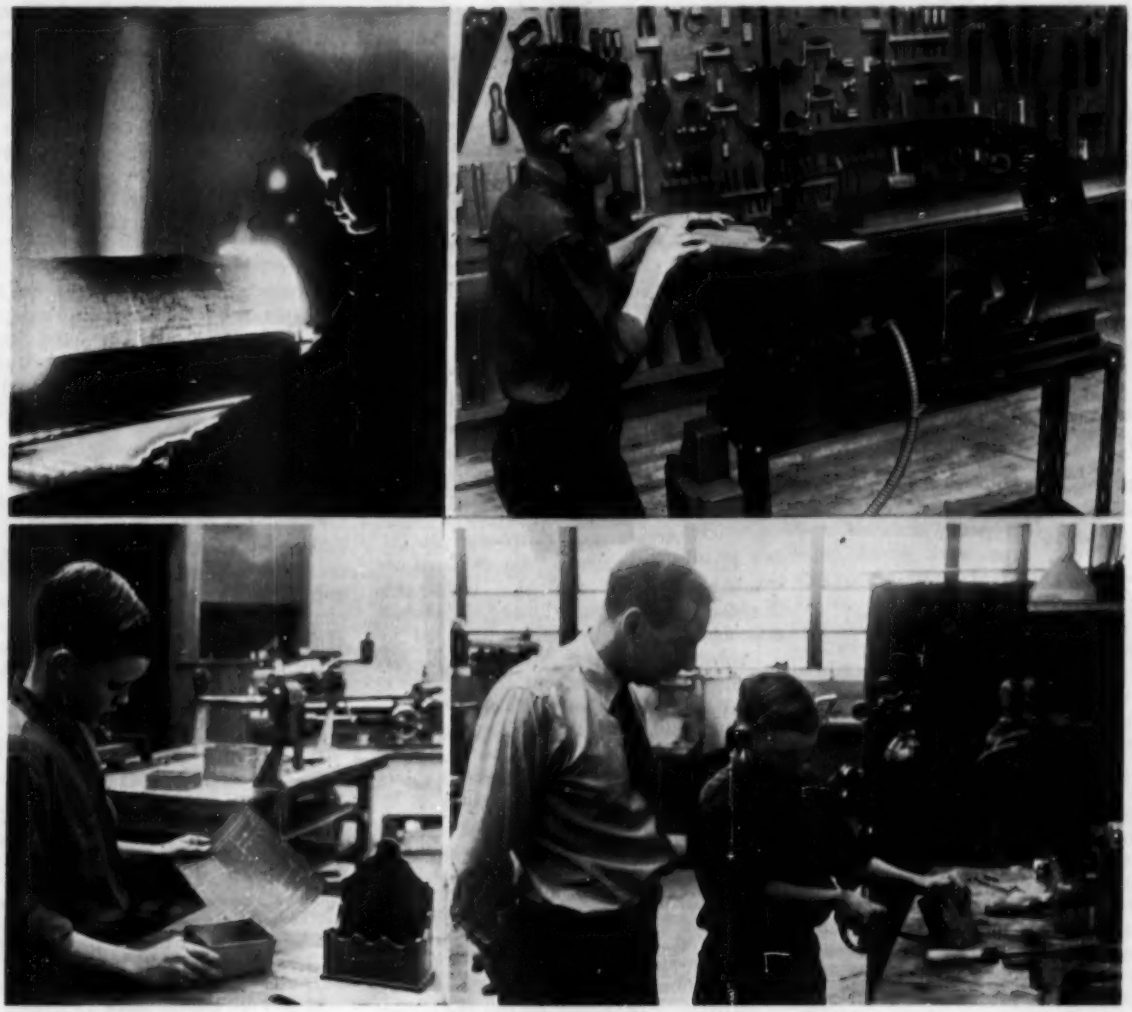
General Unit Drawing Course

The second beginning drawing course at Evanston Township High School is open to sophomores, juniors, and seniors, and consists of one period of classroom work daily for the entire academic year. A majority of the persons taking this course previously will have taken the freshman exploratory course, although the latter is not a prerequisite.

Emphasis is placed upon providing content of a type which will be useful to all students in both present- and future-day living. The following paragraphs tell of some of the general methods which have been used in an attempt to provide content of a functional type.

Realistic Problem Material

Have you ever had a beginner in a drawing course ask you what a bearing block, a wedge spacer, or an end stop was? Did you find that it was almost impossible to give him a satisfactory answer, or to show him how such obscure objects could possibly have significance to him? The obvious answers to such questions should make it clear that the type of problem materials used in traditional drawing books and by many drawing teachers leave much room for improvement.



The above pictures, taken in industrial-arts exploratory classes at Evanston Township High School, show a freshman boy in various stages of planning a project and carrying it through to completion. After the boy has made the drawing for a planter's box in the drafting room he makes blueprints of them, as shown in the first picture

The next picture shows the student in the wood shop sawing out one of the pieces for his planter's box

In the metals shop he solders a seam on the sheet-metal box which has been designed to fit inside the wood planter's box

In the last picture (lower left) the student is shown with the completed projects.

— E.T.H.S. photos

A major share of the activity in our general unit course evolves around the use of a number of problem sheets which we have worked out. All of the problems are of objects which the adolescent is familiar with, and to which he has access in daily living. The use of such problem materials increases motivation and makes for much better understanding and clarity. Students have considerably more interest in problems which are realistic to them, and do not have the feeling that they are being burdened with meaningless exercises.

An example of how the use of realistic problem materials facilitates better understanding can be made in the teaching of geometrical construction. We teach a small amount of geometrical construction because we believe that such work is of value. We can, however, see little merit in the practice of requiring students to perform a variety of geometrical construction exercises which on the surface appear to have little significance to them. A series of problems has been worked out which makes it necessary for individuals to perform selected geometrical constructions in order to complete the problem situations. Instead of merely dividing a line into a designated number of equal parts, following traditional procedures, the student is shown how the workman could use such a method in figuring out how to space the rungs of a ladder an equal distance apart. Instead of constructing an octagon in a square, with the procedure being used as an end in itself, the student is shown how he could lay out an octagon-shaped card table in the shop.

Prior to World War II almost all drawing books followed a set pattern of presenting technical information of a type primarily useful to potential engineering students. Since the war a number of books have appeared on the market which present materials and information suited to a majority of drawing students, rather than a select few. Books in this latter category are used to good advantage for supplementary information and reference purposes in our general unit course.

Functional problem sheets have been or are being, drawn up for all phases of the general unit course. It is our plan that each year we will continue to work out additional problem sheets of such

type in order that students may have as wide a range of problem situations as possible in order to satisfy better the wide range of student interests.

Program Must Be Flexible

Any program which requires all students to turn out a set number of standardized plates does not take individual differences into account. Any program which does not recognize individual differences most assuredly cannot be educationally sound. We attempt to provide for individual differences by keeping our program flexible and by utilizing as much teacher-pupil planning as possible.

After the pupil toward the latter part of the year has had experiences with the basic elements needed to equip him with a fundamental knowledge of drawing, he has the option of continuing with more specialized types of drawing or of selecting any type work which is of interest to him. Boys who plan eventually to enter engineering school or who want more advanced work because of specific vocational interests generally prefer to continue with specialized drawing.

Boys electing to design and draw up items of interest have selected such objects as model trains, airplanes, and cars, shop projects, *hot rods*, jet airplanes, radio and television schematic diagrams, furniture, custom-built television cabinets, and table layouts for model trains. Such forms of architectural drawing as plot and floor plans and plans for home workshops, house remodeling, and photographic darkrooms have been popular. If there is any doubt about students having individual interests, consider the boy interested in becoming an undertaker who drew up plans for a mortuary. A wide variety of books, magazines, brochures, and pamphlets are available for reference and provide ideas and suggestions in this optional phase of the course.

Idea to Product Cycle

In the exploratory course the entire constructional cycle from the initial idea to the completed product can easily be worked out, because all boys are rotated through four general industrial-arts areas. Many of our boys electing general unit drawing, however, at present do not take any shop courses. It is hoped and expected that this condition will be alleviated somewhat after we have had the opportunity to *sell* such courses through the addition of the exploratory course to the curriculum.

Pupils not currently taking any shopwork are encouraged to design articles which can be carried out to completion in the drawing room, home, or some other school area. Model houses, for example, can be constructed in the drawing room from tagboard and painted with poster paints, or assembled from kits containing basic door, window, roof, and other essential units.

Modern duplicating equipment is available for producing blueprints and black-in-white prints. All students have experience in operating such equipment, and make prints of the drawings which they are ultimately going to use in the shop or elsewhere in the actual construction processes. It is commonly known that inked tracings currently are seldom used in industry. Each of our students makes at least one ink tracing so that he can have firsthand experience in contrasting the advantages and disadvantages of prints produced from pencil and ink tracings. There is little merit, however, to the time-worn practice of requiring pupils to ink a large number of drawings or tracings.

Accelerated Learnings

Early in the school year students are taught freehand sketching techniques, and are encouraged to make sketches of problems prior to making finished instrument drawings. Most people find out rather quickly that such a procedure saves them time and enables them to turn out more skillfully executed instrument drawings.

The logical question at this point is, "Why require a pupil to make an instrument drawing if he has already solved the problem through making a sketch?" We believe that such a question is not only logical, but opens the door to a means for providing experiences in a wider range of learnings. After a student has acquired a reasonable amount of proficiency in executing instrument drawings, he has the option, at various points, of making either sketches or instrument drawings. Such a procedure provides him with the opportunity to proceed at an accelerated rate and enables him to have more varied experiences in potential learning areas.

Correlation With Other School Areas

Most schools organized on a departmental basis face the problem of correlating the activities of various departments. When barriers exist between areas, as they so often do, with no apparent thread of continuity in evidence, certainly many educational opportunities are lost. We encourage boys to utilize any resources we may have available for implementing activities in any other departments. Core, unified studies, and English class students, for example, frequently work out drawings in conjunction with reports and displays.

This is not to say that we condone the prevalent practice in many school systems in which the industrial-arts department is used by other school areas mainly as a *service* area, regardless of whether the activities involved offer an opportunity for furthering educationally sound learnings, or whether they are merely an expediency for fulfilling departmental ends. Activities which can be correlated and which serve to further sound learnings for the school areas involved, however, most certainly are to be developed and offered.

Revise Content to Fit Needs

We do believe, however, that we have complete answer to the drawing problem, and realize that we have not initiated the extreme changes in drawing content which many progressive educators have advocated. Nor do we believe that we will be able to maintain the status quo now that some revisions have been accomplished.

We do believe, however, that we have taken a step in the right direction, and that we can maintain such direction only through constant evaluation of our existing program, and through making changes and modifications, when warranted, to meet better the basic needs, problems, and interests of all students.

U. S. A. LEADS IN WORLD STEEL OUTPUT

Total world steel output during 1954, was the second highest in history at 245 million net tons, according to an average of estimates by two business magazines. That tonnage represents a decrease of about 5 per cent from the record set in the previous year, but is more than 5 per cent greater than the output in any year prior to 1953.

During the year, steel producing countries in Free Europe made 73 million tons, and each country increased its output over that of the previous year. Together, they exceeded the steel output of all Iron Curtain countries by more than 17 per cent. Production of Russia and its satellites was 62 million tons.

Steel Tonnage Increases

Free Europe showed its most notable tonnage gains over 1953 in West Germany, United Kingdom, and Italy, in that order. West Germany's output increased about 2 million tons. The United Kingdom produced about 1 million tons more than in the previous year and Italy added 600,000 tons to its output. Together those increases more than counterbalance the 3 million ton gain by Russia.

The 20 major steel producing countries of the Free World accounted for 183 million tons, or 75 per cent of total output during 1954. A gain over the previous year was experienced in all of these nations except the United States and Canada.

However, the United States, with 88.3 million net tons of production during 1954, accounted for 36 per cent of the world total. Domestic output was nearly twice that of Russia, the nearest competitor, which is reported to have made a record 45 million tons of steel. — *Steel Facts.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

ARE YOU CHANGING YOUR ADDRESS?

WILL you have a new address in the school year 1955–56? If so, will you kindly notify our circulation department as soon as possible. This information is very valuable to you. A misdirected magazine may not be returned to us, and a lost copy of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is not easily replaced. With the high cost of paper and printing, our press runs have to be kept just large enough to take care of our subscribers.

Therefore, please keep us posted. Let us have your new address at least by August 15, 1955. When you send the new address, remember to give us your old one also, and don't forget to add your new zone number.

THOSE FINAL EXAMINATIONS

THE end of the year, of course, reminds the teacher of tests and examinations. This is as it should be. He is quite interested in the standings of his students, but he also wants to know how his own efforts have affected those who attended his classes.

Probably he will get a good picture of himself as a teacher if he uses Duane Chamberlain's "A Plan for Teacher Self-Appraisal," which appeared on page 151 of last month's issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. This analysis will not only give you a good idea of the kind of teacher you are right now, but it also is a good direction pointer for the earnest seeker after self-improvement.

But instructors may also care to look at a few other tests not prepared by themselves. For that reason a listing of some of the tests that have appeared in past issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION are added here.

Making and Use of Tests

"Evaluation of Test Results," John A. Jarvis, page 41, February, 1949.

"Method of Test Construction for Shop Subjects," M. O. Johnson, page 47, February, 1949.

"How to Improve Objective-Type Tests," J. T. Oldknow, page 49, February, 1949.

"Recording and Weighting Industrial-Arts Grades," John F. Friese, page 223, June, 1949.

"Grading Industrial-Arts Courses," Leon E. Falgren, page 41, February, 1950.

"Importance of Constructing Good Tests," William A. Sellon, page 63, February, 1951.

"Testing Technique for Objective Type Questions," D. L. Ballard, page 182, June, 1952.

"Improvement of Achievement Tests," John A. Jarvis, page 34, February, 1953.

Auto Mechanics

"Test — Use of Hand Tools in Automotive Shop," William A. Bowers, page 41A, March, 1948.

"Unit Test on Automobile Radios," J. Lawson Murry, page 53, February, 1954.

Aviation

"Test on the Elementary Principles of Jet Propulsion," Walter G. Hjertstedt, page 22A, March, 1948.

"Aircraft Fuel and Oil Systems Test," Walter M. Gordon and William C. Ford, page 18A, March, 1948.

"Aerodynamics Test," Walter M. Gordon and William C. Ford, page 199, May, 1948.

"Aircraft Starters and Motors Test," Walter M. Gordon and William C. Ford, page 70, February, 1949.

"Aircraft Carburetion Test," Walter M. Gordon and William C. Ford, page 47, February, 1950.

"Aircraft Structures Test," Walter M. Gordon and William C. Ford, page 71, February, 1951.

"Questions and Answers on Aviation," Isadore M. Fenn, page 41, February, 1953.

Drafting

"Achievement Test in Mechanical Drawing — Grade X — A Midyear Test," Andrew G. Lofgren, page 63, February, 1949.

"Architectural Drawing Test," William H. Bowers, page 45, February, 1950.

"Aircraft Drafting Examination," H. H. Robinson, page 53, February, 1950.

"Test — Mechanical Drawing," Fred Decker, page 56, February, 1950.

"Final Examination in Mechanical Drawing III," A. Calandro, page 58, February, 1950.

"Drill or Test for Reading Architect's Scale," Glendon O. Arvin, page 20A, December, 1950.

"Mechanical Drawing Test," Louis Barocci, page 43, February, 1953.

"Drafting Room Tests," LeRoy W. Draeger, page 168, May, 1955.

Electricity

"Electrical Achievement Test," William Kavanaugh, page 59, February, 1949.

"Tests on the Elementary Principles of Radar," Walter G. Hjertstedt, page 48, February, 1950.

General Shop

"Individual Testing in the General Shop," Clyde E. Burns, page 64, February, 1951.

Metalwork

"Test in General Metalwork," William H. Bowers, page 54, February, 1950.

"General Metal — Final Term Examination," Amos G. Williams, page 65, February, 1951.

"General Metal — Mid-Term Examination," Amos G. Williams, page 43, February, 1953.

Miscellaneous Tests

"Tests Administered to Apprenticeship Applicants," A. D. Mathison, page 55, February, 1951.

Plastics

"Test on Plastics," Robert Lloyd Cantor, page 58, February, 1949.

Printing

"Beginning Printing Test," Richard L. Gandt, page 68, February, 1951.

Safety

"Shop Instructor's Safety Quiz," William H. Van Wienen, Jr., page 71, February, 1951.

"Safety Demonstration Test," Gordon Kay Gottlieb, page 41, February, 1953.

"Examination in School-Shop Safety," Marcus E. Erickson, page 134, April, 1955.

Woodworking

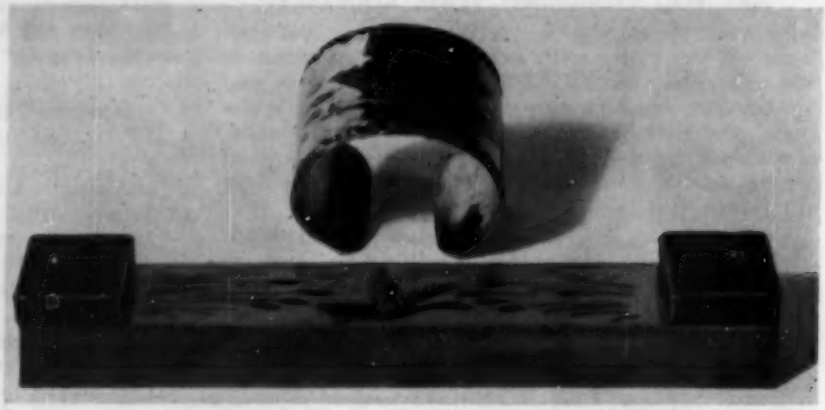
"Introductory Woodworking Test," Paul N. Wenger, page 169, April, 1948.

"Cabinetmaking Test — Related Work, Second Term," W. H. Bowers, page 56, February, 1949.

Problems and Projects

CUTTING AN ART METAL DIE

RAYMOND HOFFLUND
Industrial Arts Department
Cabrillo Junior High School
Ventura, Calif.



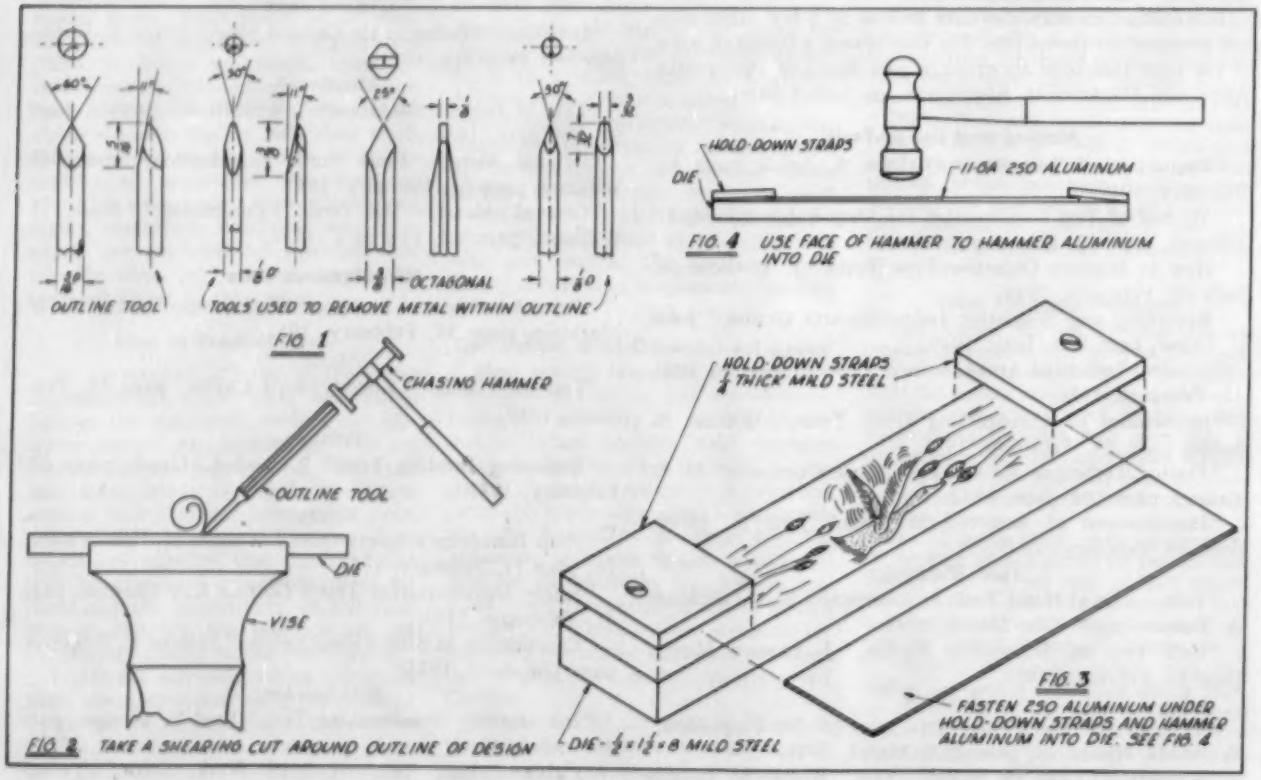
The art metal die and the project made with it

Industrial-arts teachers are constantly seeking ways to improve and make more attractive aluminum art metal projects which are within the ability of their students. Many of the traditional projects are basically good but lack that final touch which takes them out of the mediocre class. Metal pieces such as trays, candy dishes, fruit trays, bracelets, etc., can be made more attractive and appealing to the students by adding a raised design in the appropriate place. This is accomplished by placing the aluminum over the die and hammering the aluminum into the die. Eleven gauge 2SO Aluminum is preferred for this type of metalwork.

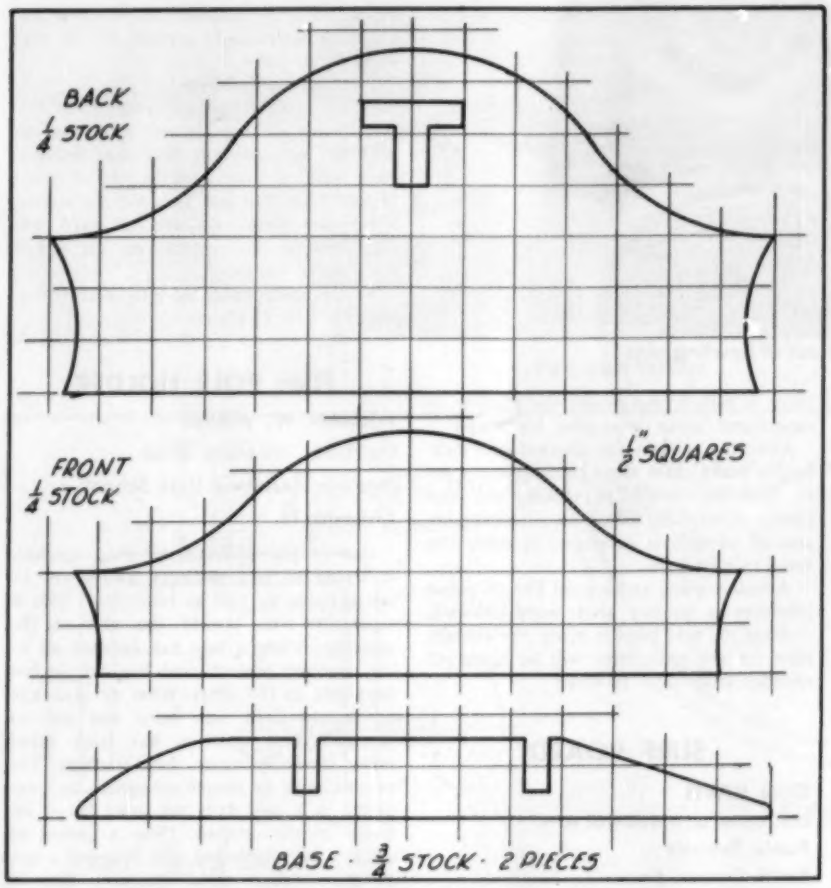
Even though cutting dies requires skill and practice, satisfactory results can be obtained on the first try if the following procedure is carefully followed. Generally speaking, all operations on cutting dies are approximately the same for all designs. For the purpose of illustrating die cutting, the author has selected a bracelet design. A drawing of the finished die is shown in Figure 3.

Procedure

1. Select an aluminum project that is appropriate for applying a design.
2. Select a suitable design that is appropriate for the chosen project.
3. Select a piece of flat mild steel ½ in.


60°
30°
25°
OCTAGONAL
OUTLINE TOOL
TOOLS USED TO REMOVE METAL WITHIN OUTLINE
FIG. 1
CHASING HAMMER
OUTLINE TOOL
DIE
VISE
FIG. 2 TAKE A SHEARING CUT AROUND OUTLINE OF DESIGN
HOLD-DOWN STRAPS
DIE
11 GA 2SO ALUMINUM
FIG. 4 USE FACE OF HAMMER TO HAMMER ALUMINUM INTO DIE
HOLD-DOWN STRAPS ¼ THICK MILD STEEL
DIE - ½ × 1½ × 8 MILD STEEL
FIG. 3
FASTEN 2SO ALUMINUM UNDER HOLD-DOWN STRAPS AND HAMMER ALUMINUM INTO DIE. SEE FIG. 4

Cutting an art-metal die by Raymond Hofflund



Detail drawing of the letter holder

thick and large enough to accommodate hold-down straps.

4. Square and smooth one side of the steel piece. If a milling or grinding machine is not available, it is possible to file and scrape the surface. Finish smoothing this side with emery cloth and cutting oil.

5. Brush an even coat of white show card paint on the finished surface and allow it to dry.

6. Draw design on tracing paper.

7. Place carbon paper under tracing and transfer design to metal surface.

8. Grind an outline tool (use tool steel) to conform with the one shown in Figure 1. A 5/16-in. pin punch, properly ground works very well for this purpose.

9. Place the steel piece in a vise. Tilt the outline tool at about 45 degrees and take a light shearing cut, around the outline of the design, no deeper than 1/32 in. See Figure 2.

10. Grind the tools used to remove metal within the outline of the design. The size and shape of these tools are shown in Figure 1.

11. Remove metal within the outline. Be careful not to cut more than 1/32 in. deep.

12. Grind the detail tools. Shapes of detail tools are determined by the design. Add any detail that the design calls for, such as swirls, pin feathers, shade lines, etc.

13. Construct steel hold-down straps and fasten them to the die with machine screws.

14. The die is now ready for hammering soft aluminum with the face of an art metal ball-peen hammer. See Figure 4.

LETTER HOLDER

GEORGE V. CARDINALE
Roosevelt Junior High School
Erie, Pa.

The letter holder shown here has been constructed in our school woodworking shop repeatedly, and it has been wholeheartedly accepted by all our seventh-grade pupils.

In addition to meeting the requirements of the basic rules of good design, the project also offers the opportunity of allowing the pupil to express his creative ability. The two uprights of the letter holder can be designed by the pupil, thereby arousing more interest in the project. The basic hand tools required for the construction of this item are the claw hammer, crosscut saw, coping saw, and smoothing plane.

The pupil also has the experience of cutting simple joints in the base of the letter holder. Pupils are very much fascinated and satisfied with the manner in which the uprights fit into the base pieces. The joint allows a margin of error since brads are used to fasten the uprights to the base pieces. The initial glued to the front piece gives the project an individuality which further satisfies the pupil.

BOWLING PIN NUT BOWL

OWEN G. PARSONS
Perth Central School
Amsterdam, N. Y.

The national pastime of bowling has grown in leaps and bounds in the past few years and as a result used bowling pins have become plentiful to anyone who would ask for them. This means free material for shop use.

As most everyone knows, the maple used in bowling pins is of the highest grade and can provide excellent stock for school shop projects.

Most instructors have tried making use of this material. Lamps have been turned out of bowling pins, but aside from a bowling pin lamp, the results have not been very gratifying.

The problem then is one of developing a project that can use the stock from bowling pins to good advantage, and individual nut bowls seem to be the answer.

Most shop instructors are rather frugal and they try to make use of all stock available to keep costs down. The answer here is to be a little less frugal and throw some of the material away.

In Figure 1, a bowling pin is shown with three circumference lines drawn on it. The center line is drawn at the widest part of the bowling pin. This is done quickly by placing the bowling pin between centers on the lathe and turning it by hand while holding a pencil against the widest part.

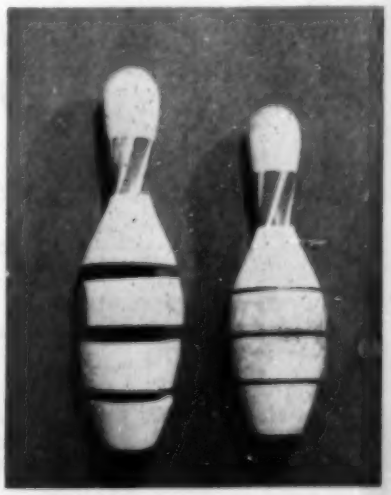


Fig. 1. Bowling pin sawed into sections

Fig. 2. Bowls turned out of bowling pins

Next, measure each side of this center line about 2½ in. and draw two more circumference lines.

Remove the bowling pin from the lathe and handsaw on the three lines. This produces 2 round blocks, a top piece and a bottom piece, as shown in Figure 1. Here is where we become less frugal, throw away the top and bottom pieces of the pin and forget about them.

Next, smooth off the small ends of each block on a disk or belt sander. Next, find the center of the smaller end and mount it on a 3-in. faceplate.

Let the student work out his own design. With a little help from the instructor the student will usually produce a bowl of acceptable shape and design.

In Figure 2 can be seen some of the designs worked out by the ninth-grade general shop students. As can be seen, the students get an opportunity to create designs of their own choosing. The chance to create design is one that is too often suppressed, and yet it should be encouraged in this project. The fact that the material is free, and there is no cost penalty if a piece is ruined, encourages the student to experiment while developing his design.

After the student has finished one dish, he can make three more to complete a set of four nut bowls. In making the last three match the first, a considerable amount of skill is developed in using the wood turning lathe.

A final sanding and a good French polish produces a project well worth owning.

After the first bowl is made, the average time for the next three will be about 45 minutes from start to finish.

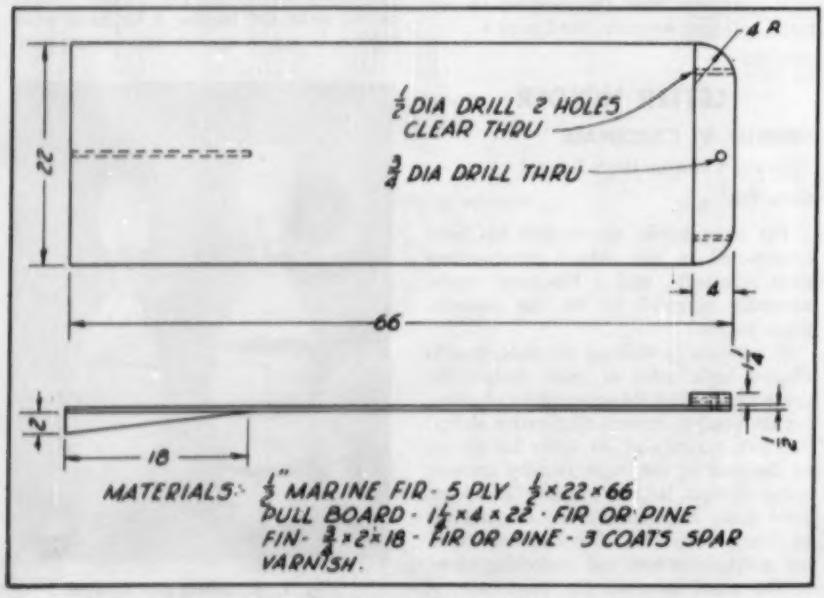
SURF BOARD

DON DAVIS
Instructor of Industrial Arts
Public Schools
Smith Center, Kans.

With the construction of many new federal lakes and the accompanying water sports that these impoundments are providing, this project may be well received. Water sports are today providing the fastest growing recreational outlet and are being enthusiastically greeted by all ages from six to sixty.

The surfboard shown herewith has been tried and proved. Rubber footing mats may be attached. These are not shown in the drawing. We pull our surfboard successfully with a fifty foot length of ¾-in. Manila rope. We use for adults a sixteen horsepower motor, and for the small children (up to 100 pounds) we use a five horsepower motor.

This project should fit into most Woodworking I or II classes.


4 R
½ DIA DRILL 2 HOLES CLEAR THRU
¾ DIA DRILL THRU
22
4
66
2
18
MATERIALS: ½" MARINE FIR - 5 PLY ½ × 22 × 66
PULL BOARD - 1¼ × 4 × 22 - FIR OR PINE
FIN - ¾ × 2 × 18 - FIR OR PINE - 3 COATS SPAR VARNISH.

Detail drawing of the surf board

FISH POLE HOLDER

WILLIAM W. WIESER
Instructor, Machine Shop
Harrison Technical High School
Chicago, Ill.

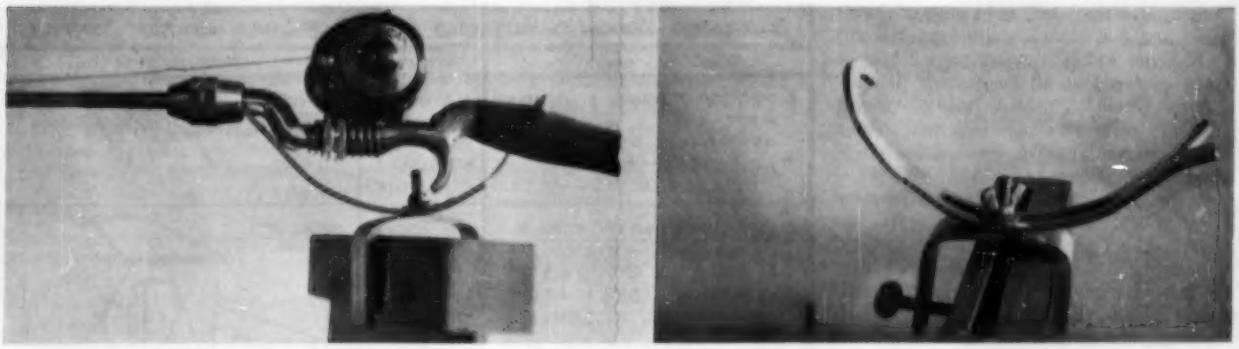
One of the problems of shop teachers is trying to find projects which will be instructional as well as functional. This is especially true toward the end of the semester, when a boy has finished all of the required projects and has only a few days left in the shop. What to give him to do, to keep him busy and out of trouble? This question has been asked many times by many shop teachers. The project must be simple enough to be completed in a few days yet must be of interest to the student. Over a period of years I have collected and designed a few of these "short term" projects. One of these is a brass fish pole holder.

This project has created a great deal of interest in my shop. Many boys hurry to complete the required projects just to make the fish pole holder. The average boy can complete this project in less than one week; therefore, it fits in fine at the end of the semester. The body of the holder is made of ⅛-in. flat brass, while the clamp is made of a 3/16 by ⅞-in. brass strip. It will save much time to purchase the wing nut and thumb screw. The total cost of materials is about thirty cents. This fish pole holder is unique in that it may be attached to either the side of the boat, the transom of the boat, or even on the seat. It may be used on a pier by clamping it to the floor boards. It may be turned to any angle or tilted to any position. It may be used for trolling with a casting rod or for still fishing with a cane pole.

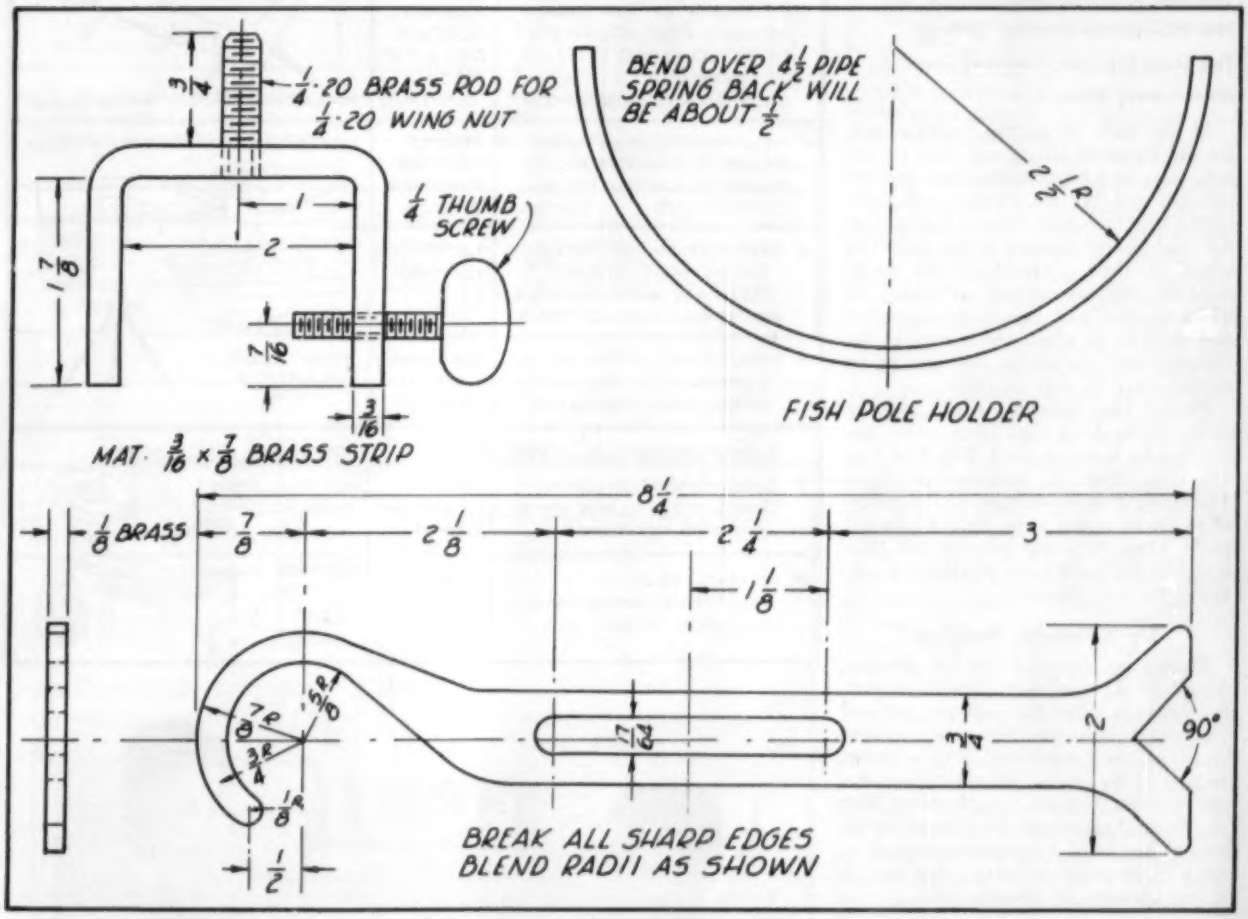
Following is a list of the tools and materials needed and a step-by-step procedure:

TOOLS AND MATERIALS

1 piece of brass ⅛ x 2 x 8¼ in.
1 piece of brass 3/16 x ⅞ x 5¾ in.
1 piece of brass rod ¼ dia., 1 in. long
1 — ¼ — 20 wing nut
1 — ¼ — 20 x 2-in. thumb screw
1 — ¼-in. brass washer
1 — ¼-in. lock washer
dividers



Fish pole holder


¼-20 BRASS ROD FOR ¼-20 WING NUT
¼ THUMB SCREW
MAT. 3/16 × 7/8 BRASS STRIP
BEND OVER 4½ PIPE SPRING BACK WILL BE ABOUT ½
FISH POLE HOLDER
⅛ BRASS
BREAK ALL SHARP EDGES
BLEND RADII AS SHOWN
90°

Detail drawing of the fish pole holder

scriber
combination square
¼ — 20 die and stock
¼ — 20 tap and wrench
countersink
⅛-in. drill
$^{13}/_{64}$-in. drill
$^{17}/_{64}$-in. drill
center punch
ball-peen hammer
vise
hack saw
small round file
mill file
drill press
1-in. paint brush
clear lacquer

Procedure

Body

1. Lay out as shown in drawing.
2. Clamp in vise and drill series of $^{17}/_{64}$ holes for slot in center.
3. File slot to size.
4. Center punch outline of body shape about $^{5}/_{64}$ of an inch away from lines.
5. Clamp in vise and drill outline of body shape with ⅛-in. drill.
6. Cut to shape with hack saw.
7. File to shape.
8. Bend body around 4½-in. pipe. Spring back will be about ½ in.

Clamp

1. Lay out as shown in drawing.
2. Drill $^{13}/_{64}$ hole, $^{7}/_{16}$ in from one end.
3. Drill $^{13}/_{64}$ hole, 2⅞ in from one end.
4. Countersink center hole about $^{1}/_{16}$ in. deep.
5. Tap both holes with ¼–20 tap.
6. Clamp in vise and bend to U shape. Be sure the countersink is on the inside of the U. Heating with a torch at point of bend will help prevent breaking.
7. Thread ¼-in. brass rod to required

length. Use long rod, thread, then cut to size.

8. Screw rod into center tapped hole — peen over end to fill countersink portion. Center punch at intersection of peened end and body of clamp with four center punch marks. This will prevent the screw from coming loose.

9. Assemble holder and coat with clear lacquer.

POLYESTER PLASTICS IN THE SCHOOL SHOP

ALEXANDER F. BICK

Teacher in Milwaukee Schools

The Milwaukee-Downer College

The Stout Institute, Summer Session

Milwaukee, Wis.

At the close of another teaching year we find ourselves setting our faces toward new ideas and broader programs for the fall semester. We are convinced that the time is here for school shops to line up with the trail-blazing industries who make no secret of their approval of the newer materials, the widespread application of which makes it both logical and imperative that students in school today train in the concepts and approaches destined to be commonplace in days to come.

Plastics have become a major industry in the billion dollar class for no other reason than for technical merit. They have long ago risen from an experimental status. Therefore, it is the opinion of the writer, often voiced in this series, that schools will profit when they add plastics and their round of new experiences into the new programs for next September.

An Advanced Program

Plastics are chemical. On first thought, they ill fit the shop setup. This is not true, luckily. It is a fact that one can saw and file precast plastic sheet like wood, realizing no advance over woodwork. While a limited amount of this may be desired, it is not the real solution. Schools should rather offer the chemical experience. To this end, heavy presses and related equipment, typical of much of the plastic industry today, are out of the question for schools.

No Special Equipment Needed

At this point enter the room-temperature polyester laminating and casting resins, and the low-temperature polivinyl molding plastics, both ideal for school shops. To work with them demands not a cent's worth of equipment other than that which the shop already has. The way is, therefore, clear for change of program. "What sort of program?" is the logical question that this article tries to answer. Due to the present trend in commodity design, it would seem inadvisable to suggest independent plastics courses where they are not already estab-

SUGGESTED WOOD-NEW MATERIALS COURSE OF STUDY FOR NEXT SEPTEMBER

TEACHING UNIT	PROCESS	PROJECT
1. USE OF TOOLS : WOODS. METHOD. APPROACH TO PROBLEM. USE OF TIME. TREND IN DESIGN	LAYOUT. SAWING. PLANING. NAILING. FINISHING	TRAY. WOOD.
2. PRACTICE WITH TOOLS. LEARNING METHOD. PROBLEMS OF INDUSTRY. INDUSTRIAL STANDARDS. INDUSTRIAL DESIGN.	AS ABOVE. FORMING	SHELF. WOOD.
3. PRACTICE WITH TOOLS. ECONOMY OF TIME. ECONOMY OF MATERIAL. REGARD FOR EQUIPMENT. GETTING ALONG WITH PEOPLE. DESIGN IN ENVIRONMENT.	GLUING. CLAMPING. JOINING. SCREWS. DRILLING. METAL CUTTING	MAGAZINE CASE. WOOD-BRASS
4. NEW METHODS IN INDUSTRY. PLASTIC CASTING. PLASTIC LAMINATING. CEMENTING.	FORMS. CASTING. FINISHING.	CANDY BOWL - PLASTIC & WOOD
5. FABRICATION OF PROJECT FROM CAST SHEET. (BOTH ARE BASIC PROCESSES) INDUSTRIAL APPLICATIONS.	CEMENTING. CUTTING.	DRAFTING TRAY. ALL PLASTIC
6. STRUCTURE WITH WOOD & LAMINATED POLYESTER. (FIBERGLASS REINFORCED)	CEMENTING WOOD TO PLASTIC.	TRAY STAND. PLASTIC & WOOD
A SHOP PLASTICS LABORATORY		CONTINUING THE ABOVE.
7. EXPERIMENTATION WITH CASTOLITE, A CLEAR WHITE CASTING POLYESTER.	COLORING. EMBEDDING. CURING.	KEY-RING DISKS. PAPER WEIGHTS. 1½ DIAM.
8. MAKING MOLDS WITH PLASTISOL (POLYVINYL) FLEXIBLE RESIN.	MODEL. CASTING. CURING.	CASTOLITE PENDANT. MODEL. MOLD. APPROX. ½ x 1 x 1⅝

Fig. 1

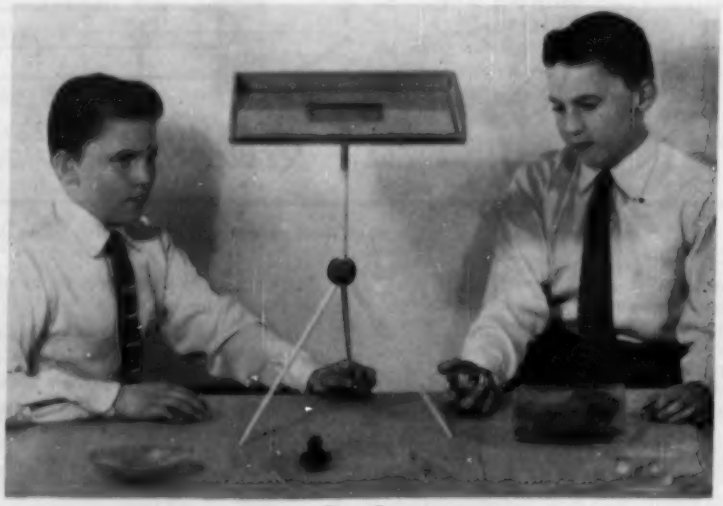


Fig. 2

— Photographs, Milwaukee Commercial Photographers, Inc., Milwaukee, Wis.

SUGGESTED METALS - NEW MATERIALS COURSE OF STUDY FOR NEXT SEPTEMBER.

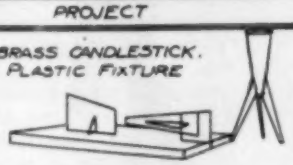
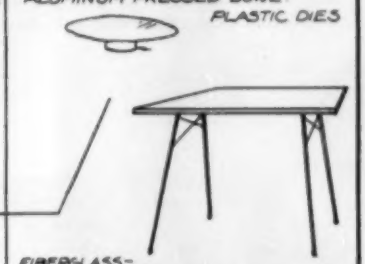
TEACHING UNIT	PROCESS	PROJECT
1. USE OF TOOLS & EQUIPMENT. COMPARATIVE METALS. JIGS & FIXTURES FOR QUANTITY PRODUCTION. FABRICATED PLASTIC FIXTURES. METAL JOINING.	LAYOUT CUTTING SHAPING CLEANING SOFT-SOLDERING FINISHING	BRASS CANDLESTICK. PLASTIC FIXTURE 
2. METHOD IN MODERN PRODUCTION. DIES MADE THE FAST PLASTIC WAY. INDUSTRIAL COSTS & SUPPLY. COMPETITIVE PRICE PROBLEMS. AUTOMATIC PRODUCTION FOR UNIFORM HIGH QUALITY PRECISION WORK. ECONOMY OF TIME.	DIE MAKING BLANK CUTTING. PRESSING. FINISHING CEMENTING	ALUMINUM PRESSED BOWL. PLASTIC DIES 
3. STRUCTURAL PROBLEMS. STRENGTH & LIGHT WEIGHT. TESTS & MATERIALS DATA.	LAMINATING EMBEDDING	FIBERGLASS-POLYESTER TABLE TOP WITH HONEYCOMB PAPER CORE - BRASS LEGS
SUPPLEMENTARY EXPERIMENTAL WORK IN PLASTICS		
4. INDUSTRIAL SALES PROMOTION PRODUCT EXHIBIT SET-UP. REPRODUCTION OF SMALL PARTS.	EMBEDDING. PLASTISOL MOLDING.	CAST TRANSPARENT EXHIBITS OF PARTS & ASSEMBLIES. MOLDS & CASTINGS OF PARTS, AS SHOWN.

Fig. 3

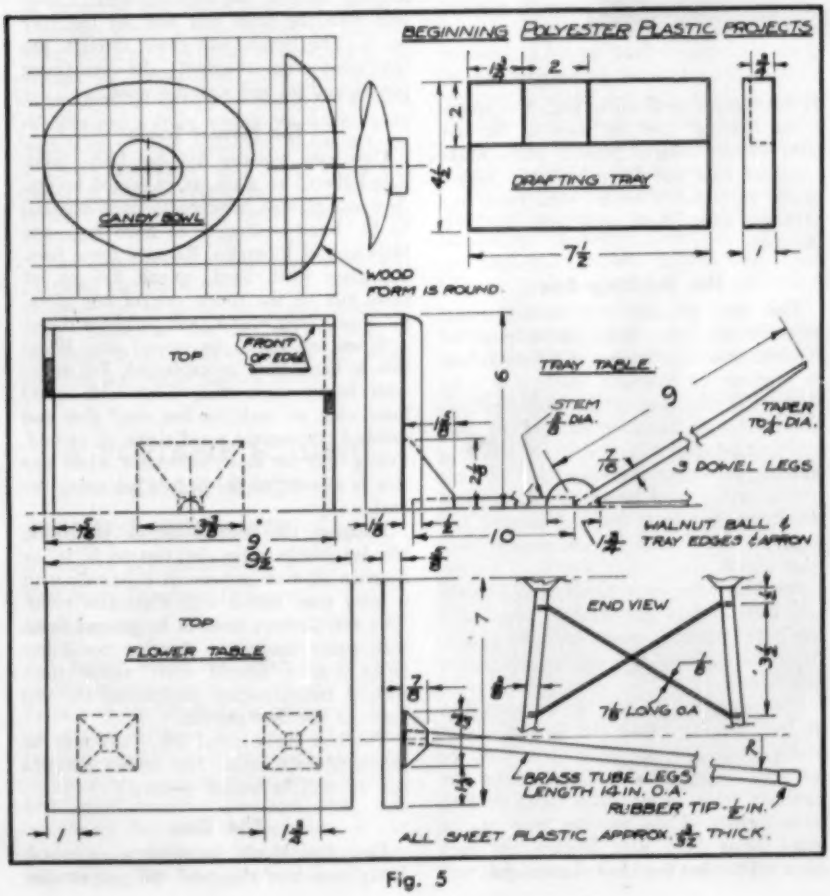


Fig. 5

lished. Rather, it is preferred that present courses be renamed and broadened in scope.

Substituting "Old and New" for "Old" Alone

The *trend* commodities today, especially in the home furnishing area, are strikingly different from those of any period thus far. They are made of combination materials: plastic with metal, wood with metal, plastic with wood, etc. Shall the schools come abreast of this trend? The idea seems to have permanence, mainly from the fact that the practice agrees with the *space* concept of an air age; and whether it seems of moment or not, our potential citizens will live in the zenith of that age, so that schools cannot deny them training in the ideas of their day.

The school shop in particular should meet the problem as industry meets it and as the times demand; and of course, this means broadened courses.

Suggested Changes in Program

The accompanying illustrations give an idea of areas to be covered. The teaching units shown list a wealth of material designed to make the most of industrial standards, methods, and problems. The wood and metal projects in Figure 1, are typical of the contemporary trend and are subject, of course, to change. The plastic projects, however, representing as they do untried experiences for the teacher, are recommended as simple and basic in process, and it is suggested that they remain as beginning projects. The plastic section may be taken bodily out of the prescribed programs and placed into any similar situation. It will be noted that the projects for the woodshop are actual wood and plastic projects, while two of those for the metal shop are accessory to the metal project, being the material of fixtures and dies. The idea may easily be enlarged upon.

The supplementary work can be most intriguing. With a little experimenting by boys under supervision, a long list of possibilities pops up. This is the experience in every class. Small projects with a purpose, of course, are popular. The No. 1 seller in the novelty class is the paperweight held by one of the boys shown in Figure 2. The casting is made inside an electric light bulb, embedding a dried pansy, which has been buried under dry "cream of wheat" for three days. The flower comes out in its full color, and flat. Other popular novelties are key rings and pendants, both of Castolite, and both with embedments. Short lengths of bright copper wire are held in the pendant casting. The mold for this is cast on glass with a glass fence over a plastic or wood model, highly finished and smooth and coated with a film of silicone, a mold release. The molding material is Castomold, at 350 degrees, flexible, polivinyl plastisol. Our furnace is a shop-made insulated metal box with two heating elements of the common, house variety.

Next to novelties come the embedding of such items as shells, insignia, small ore specimens, fossils, etc.

The more useful projects from the standpoint of teaching are those of instrument assemblies, and embedments showing insides of destructible teaching material, like a "B" battery, etc. Parts of class projects may also be exactly duplicated as a miniature bridge column casting, sealed with Castomold and cured. When it is ready for the pouring, flow Castomold over the model, and then cure it at 150 degrees.

Fig. 4

Then the casting of duplicates of Castoglas filled with glass fiber. Tough glass filled gears and parts are simple to reproduce.

The glass fiber filled Castoglas aluminum bowl die is shown. The blank is placed between punch and die and pressed. A bowl is produced in a second. This thrills the student and shows him the industrial way. Industrial plastic dies such as this are made at a great saving of time.

The bowl in Figure 3 may be as simple as two round Fiberglas cloth pieces can make it, merely painting Castoglas over them on the wood form. However, the bowl shown boasts an extra top layer of tempera painted organdy cloth (any open weave cloth). The subject is "locomotives" in green and white, the entire area being filled with them, and smoke.

Both tables are detailed in Figure 5. The one has dowel legs and the other has legs made of brass tubes. The table shown in Figure 4 should be especially noticed. The thickness of the top is due to a half inch honeycomb paper core laminated top and bottom to Fiberglas-Castoglas sheets which were cast first. The boys shown in Figures 2 and 4, as well as their classmates, have made a variety of these tables. Some were made with figured cloth tops, others with solid color, while the one shown in Figure 4 has the top and edges covered with embedded ground cork. The procedure for the beginning projects is as follows:

The Plastic Bowl

Provide a mold and shellack it to a high gloss. Apply Castolite mold release, and floor wax. Cut two 7-in. diameter pieces of Fiberglas cloth.

Spread newspaper, pour 1½ ounces of Castoglas, using paper cup, and add 10 drops of hardener. Stir, then spread it over both sheets of fiberglas on the form, using a 2-in. width of cardboard as a brush.

Brush out bubbles. Allow it to gel. When just gelled, loosen edges with a knife, but do not remove until fairly firm. Use spatula for removal. Cut the bowl to the free form shown, using a tinner's snips. Make a wooden base and carve it slightly hollow to fit the bowl. Cement with resin and hardener mix; then sand and wax. Oil the base.

The Drafting Box

This may be used for storing model parts, money, etc. Work on a piece of window glass. Cut a piece of Fiberglas mat or 2 pieces of Fiberglas cloth, size 8 by 10 in. Lay the mat or the two sheets of cloth, one over the other, on the glass. Mix 2 oz. of Castoglas with 15 drops of hardener and stir well. Pour this over the Fiberglas, spread evenly, and brush out all bubbles. Allow the casting to gel and harden. Remove the sheet with the sharp edge of a wide chisel.

Saw one edge on a board with a backsaw held against the straight edge of a top board, clamped down over the plastic. Also saw an end at right angles to the first edge.

Next, saw out a piece 7½ in. wide. Out of both pieces, sawing the long way, cut width of 4½, ¾, 1,1, and 1,1 in. Cut the last two pieces 4⅝ in. long. Make two partition pieces ¾ by 2. Cut 3/16 off the long ¾-in. width. Then set the tray up on glass, using bent wire holders for each piece. The holding had better be well worked out so that nothing can move while cementing.

Make a shaper tin trough with the tip cut to a point. Mix a small amount of Castoglas and hardener and add Castosil, the glass powder filler. Drop some of this into the trough and let it run down slowly to the point while the cement is fed into all joints on the bottom. Allow this to gel and then set the box on its side and fill the vertical joints. If any of the cement runs where it is not intended to be, it may be straightened up with the edge of a piece of cardboard.

The Tray Table

Make a flat casting of reinforced resin, as above, using two pieces of 9 by 12-in. oversize Fiberglas cloth. When hard, cut as described in the foregoing, to exactly 9 by 12 in. Sandpaper ¼ in. on three sides of the glossy edge to anchor the cemented sides.

Cut and sand the wood sides and apron. Make all other wood pieces. Mix a small amount of plastic and hardener and add Castosil. Run a line of the mix on a plate of window glass. Dip the edges of the sides and back, and place them. When gelled, do the same with the apron. Be sure the plastic covers the joint. Also run cement into the vertical corner joints.

Draw a line design of some sort on the flat top face of the stem terminal. Cover this with the resin mix and set the tray on it. The design will show through the laminated top. Cement the remaining pieces, and oil and wax the wood.

The Flower Table

Cast two oversize 9½ by 14-in. laminated sheets on glass, as explained before. Also cut enough honeycomb core material to fit. Each casting is to have only one thickness of Fiberglas. Remove these from the glass when hard, spread 1½ oz. of resin mix on the rough side of one piece, set honeycomb over it, and weight it down.

When set, repeat on second side. When this is hard, trim as explained. Fill edges with heavy resin mix, filled with wood flour, clay, or cork; or use vinyl glue and sawdust; or cement wood strips all around. Filling will be most successful when one side is allowed to gel before beginning the next.

Roughen the bottom before cementing the leg blocks. Use the top as it is, or roughen all over and recoat it heavily with a resin coat mixed with Castoglas color. This will perhaps need to be ground down with water sandpaper. Another possibility is to cast a figured open weave cloth with a contemporary design, on the top layer of the first casting.

The legs are a metal job. They may be cemented with resin. The rubber bottoms can as well be pencil erasers.

The Dies

Cast two bowls, as already explained. Make two iron rings, of the proper size.

Set one on the bottom side of the bowl casting, and the other on the top of the second casting. Cut a maple block to fill most of the space on the latter.

Mix enough Catoglas to seal the iron-plastic joint, using Castosil to thicken the seal. When gelled, mix enough resin, hardener, and Castosil to fill the dies. Weight the maple block.

When hard, set on wood, and provide some means of aligning.

There is not room to list the benefits to be derived from this program so the proof will be left to those who value the stated possibilities. Such teachers will need to provide themselves with essential materials ready for the opening of schools in September.

Organization of Supply

My own shop experience may be helpful at this point. I am not at all sure that I would have been particularly impressed by literature alone, but during the laminating of a candy bowl, I was astonished at the simplicity of the method, and the experience had in it an element of shock from the thought that this development had been going on in industry unknown to schools. Having thus witnessed a firsthand demonstration, there was no need of experimenting on my part, so I ordered a 9-lb. can (gallon) of Castoglas with 9 units of hardener, and along with it, 2 yards of Fiberglas cloth, a few ounces of Castosil filler, and a pint of brush cleaner, for I had visions of chairs and trays and tables. Since then, we have used nearly ten gallons of this resin from which we have made such a diversified collection of projects as 7 chairs, 20 tables, and many trays and bowls, a suitcase, radio case, etc., all produced by seventh- and eighth-grade students.

The cost is quite reasonable also. For example, the three items in the woodshop program can be made out of one pound of resin. Therefore, the cost of the bowl is less than 50 cents, the tray about the same, and the tray table slightly more.

A PORTABLE FOLDING CHAIR RACK

CHARLES E. SHOEMAKER
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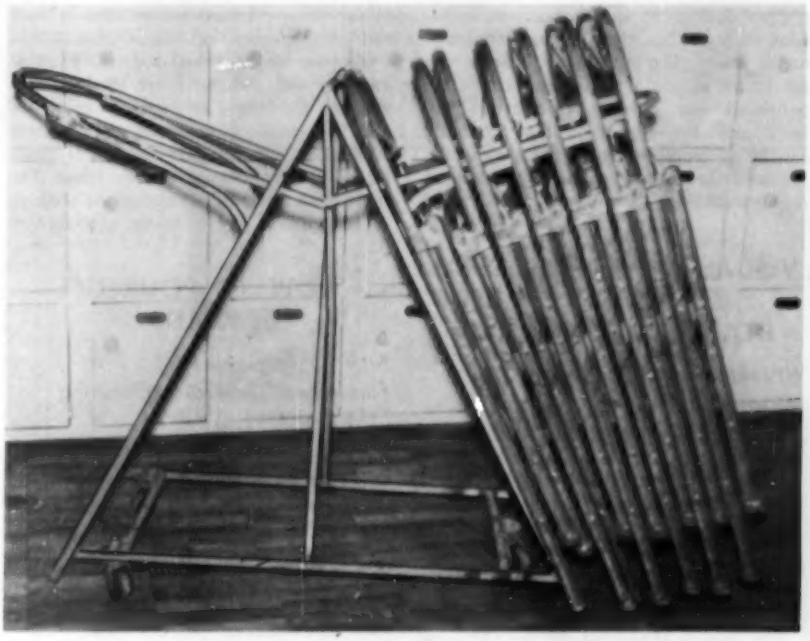
Ball State Teachers College
Muncie, Ind.

A factor which has much to do with success in teaching is the concern for the welfare of the students at all times. It is not enough to have well-prepared lessons, excellent chalkboard illustrations, and some of the other prominent factors associated with good teaching practices, and then completely disregard the placement of the students in deference to biological considerations. The wise teacher should consider these points: (1) are the students arranged so that they may visually observe the demonstration, and (2) are they comfortably situated so that they can concentrate on the lesson? Too often students are required to sit on hard bench tops which offer no support of the back or legs, or are required to stand for extended periods of time. Such disregard for the physical welfare of students is being practiced in many schools by industrial-arts teachers.

The ideal situation would be an auxiliary classroom adjacent to the industrial-arts laboratory. However, such a room does not lend itself to all teaching situations because many lessons or demonstrations must be conducted in the shop proper where equipment, tools, and materials are readily available. A situation that would involve classroom chairs and seating arrangement, but flexible enough to be established at the place of demonstration would be satisfactory for meeting the two points previously outlined. The use of folding chairs that can be placed in proximity to the machine, bench, or area in which the lesson is to be conducted is worth consideration. This presents a storage problem as well as the time loss in carrying and placing chairs. Some schools are using folding chairs as a part of the physical setting by placing open chairs at a preconceived point, but this requires floor space and is not as flexible as the *area to area* arrangement. The portable folding chair rack as shown in photograph seems to be an answer to this problem. The rack was designed to hold from 16 to 18 chairs which would be adequate for a general shop.



Side view of the portable rack for folding chairs

A portable folding chair rack

The rack was designed for minimum floor space which would help in finding a storage space that is centrally located so as to be accessible to all areas of the shop. The angle arrangement of chairs helped to hold the chairs in place as well as to remove some of the load from the holders. The frame and holders are made of ½-in. square, cold rolled steel and fabricated by welding. The rack has been constructed of ½-in. angle iron with excellent results.

How can this rack be used to minimize the loss of time in carrying and placing the chairs? Before the class arrives the teacher can push the chair rack to the area of demonstration, and as each student enters the shop he removes a chair from the rack and places it in a semicircle, U formation, or in whatever manner the

teacher desires. In like manner, each student replaces his chair upon completion of the lesson. The students will accept this procedure as routine once they have experienced the comfort associated with back and leg support. This procedure can be accomplished with little confusion provided the teacher assumes management responsibilities.

VISUAL AID FOR GENERAL SHOP HOUSE CONSTRUCTION

WILLIAM L. DUDAS, JR.

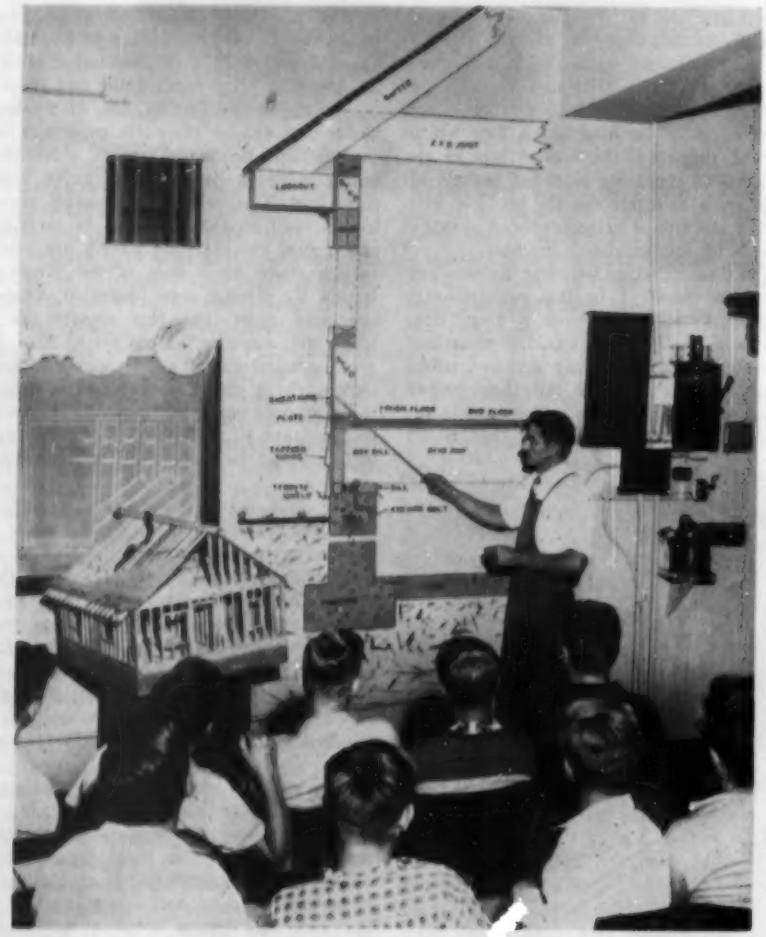
High School

Grandville, Mich.

The illustration shown herewith presents full-size house construction details which were painted on the bare wall of the school shop so they would always be available for the students' examination and reference.

The cross-sectional view covers a wall space of approximately 6 by 12 ft. The colors used in the visual aid are the same as the actual materials found in house construction. All parts are outlined in black and are identified by 1-in. capital letters.

The use of this visual aid created great interest, and the parts are easily distinguished and show relationship of actual sizes of standard materials. Since many families have undertaken the task of building their own homes I have found that there is a greater desire among the students to know more about house construction.



Visual aid for house construction

HOW TO POUR OFF MOLDS

K. E. PARR

Formerly in General Engineering Department

Purdue University, now

Director, Centro de Entrenamiento Industrial

Socony-Vacuum Oil Co. of Venezuela

Caracas, Venezuela

1. If needed, obtain someone to act as a skimmer.

2. Wear goggles.

Fig. 1. Cut in from the front

3. Protect legs and feet properly. Use safe shoes and leggings.

4. Inspect the crucible or pouring ladle. New rust is a sign of dampness. Do *not* use a cold, damp ladle without pre-heating it.

5. Cut into the molten stream of metal from the front. See Figure 1.

6. Fill the ladle about three-quarters full.

7. Skim the dross (impurities) from the top of the metal.

8. Carry the ladle to the molds, taking care to *walk forward* at all times. Do not hold the ladle higher than is necessary to skim over the floor as you walk.

9. Choose the first mold to be poured so that each succesive mold can be poured by walking *forward* to it. See Figure 2.

10. Be sure that you have *more than enough* metal in the ladle to fill the mold; otherwise *do not pour.*

11. Be sure that your metal is not chilling. Do not pour metal that is close to chilling.

12. Pick out the sprue hole. It should be marked. The mold may need a jacket and weight.

13. Assume a pouring position that allows both knees to be slightly bent. When pouring from the right, the right knee or thigh may come in contact with the ladle handle.

14. Keep the lip of the ladle as near to the sprue as possible. See Figure 3.

Fig. 2. Move forward

15. Begin to pour. Try to judge how much metal the mold will require. While pouring, the skimmer should not skim, but only hold back impurities.

16. Pour the mold with a steady, *uninterrupted* stream. Fill the sprue quickly and *keep it filled* as you pour.

17. If the metal breaks out of the parting, or if it bubbles or blows back badly, *stop* pouring. The mold is a failure.

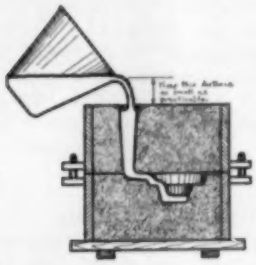


Fig. 3. Keep the sprue filled

18. As you finish filling the mold with metal, cut the ladle short quickly; that is, tilt the ladle back quickly.

19. Pour any metal left over into a dry ingot mold.

20. Light escaping gases which have not ignited.

21. Douse other fires with a shovelful of sand.

22. The jacket and weight can be shifted to another mold.

Questions

1. What is chilled metal?
2. Why is it dangerous to pour molds that are placed on a bench?
3. Why is it dangerous to pour molds that are placed on a concrete floor?
4. Give two reasons why the sprue is kept filled after pouring once begins.
5. Why is molten metal never poured into a damp ladle?
6. Why is the bottom of the ladle kept close to the floor at all times?
7. Give two reasons why the molten metal might bubble, or "blow" back through the sprue.

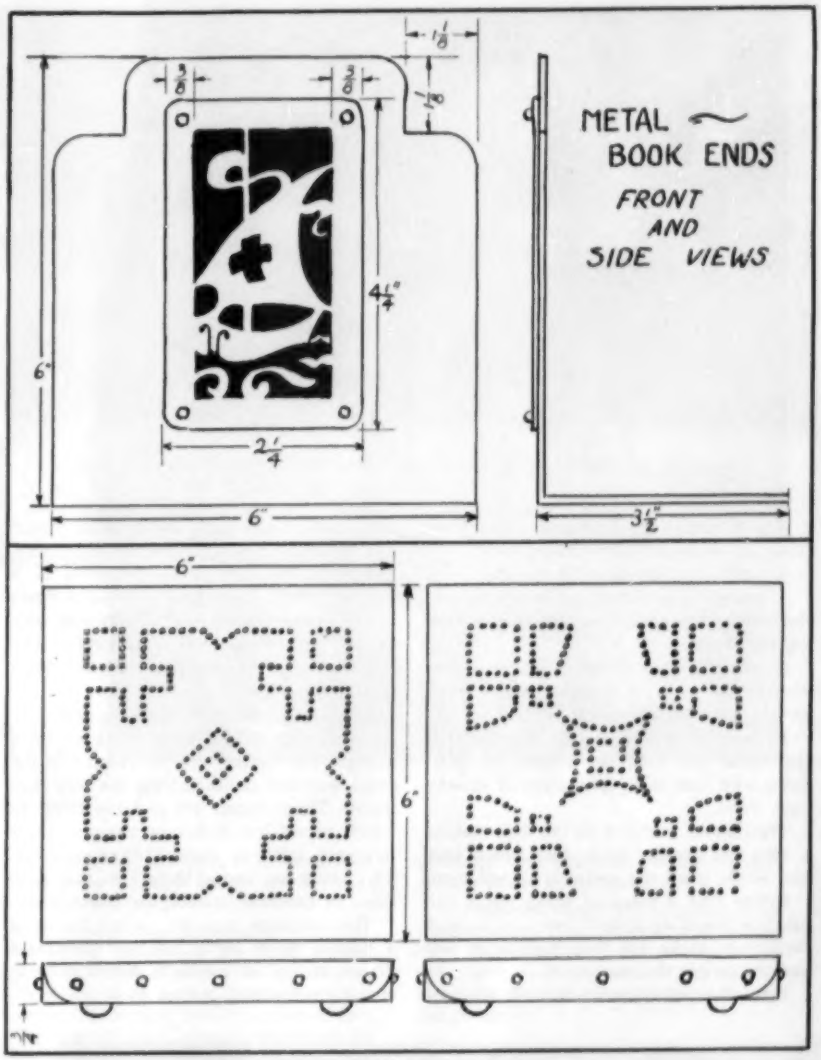
COPPER BOOK ENDS AND TEAPOT STANDS

WILLIAM S. RICE

Oakland, Calif.

The two interesting and practical problems shown herewith, a book rack and teapot tile or stand, are not difficult to make of hammered copper, and the finished articles will be found to be useful as well as ornamental.

You will need for the book ends, two pieces of 6 by 9½ in., 18-ga. copper, and two pieces of 2¼ by 4¼ in., 20-ga. brass which will be used for the decorative, saw



Details of the metal book ends and teapot stand

pierced overlays. Eight roundhead brass rivets will be required to rivet the brass plates in place. A piece of violet, green, or navy blue, ooze leather is placed under the brass plate before it is riveted in place. The copper is surfaced in the usual way with the ball-peen hammer but the brass plates are left smooth except the edges which may be beveled with a ball-peen hammer. Bend in a vise.

The copper should be oxydized in a bath of warm liver of sulphur, wiped and brushed over with wax shoe polish, before the brass plates are riveted in place, as the chemical used would injure the color of the leather should it come in contact with it.

A drill should be used to make the rivet holes. Great accuracy is necessary to get the holes in proper alignment.

The design for the medieval ship should be carefully drawn on Manila paper, a duplicate traced and when satisfactory, glued down on the brass before attempting the saw piercing.

Patterns for book ends are best made by folding a stiff piece of Manila paper, drawing one half of the design and then cutting out the whole with a pair of scissors. This method insures a perfectly symmetrical pattern. The work on the metal is easier to do when the cutout pattern is glued to the copper. This method is more accurate than tracing.

Teapot tiles are most useful in the home and the tile here described will not break when it falls or when it is handled roughly.

To make this practical article the following materials are needed:

1 sheet of 30-ga. copper or brass 7¼ in. square.

20 copper tacks, roundhead preferred.

4 upholstery nails, brown most suitable.

A nail of medium size, the point of which should be rounded with a file to be used as a punch.

Examples of copper book ends and teapot stands by William S. Rice

A 6-in. square block of pine wood ¾ in. thick which should be stained brown.

A mallet for punching the design.

A smooth pine board on which to rest the metal while you are *repousséing* or raising the design.

In selecting your design it is best to first attempt one with all straight lines. Curved designs may be attempted later on.

Paste your design on the underside of the metal and tack the copper or brass down with four tacks on a piece of smooth pine wood.

Then punch gently with the nail, making a series of regular little dots which look like beads when the metal is turned over.

Better take a piece of scrap metal and practice punching it until you gain enough facility to make the dots regular in size and the proper distance apart.

Bend the two opposite flaps in the vise then slip in the 6-in. wood block. Bend the remaining edges on the block by resting it on the surface of the anvil or a smooth board. Then tack the metal down to the block, making small holes first with an awl in order to keep them regular. The corners need to be slightly filed and rubbed with fine sandpaper.

Next, four upholstery nails are tacked to the underside of the wood block to serve as legs. The copper may be colored in the usual way and polished with the wax shoe polish. These stands are just the thing on which to set hot dishes or teapots. Their lightness adds to their utilitarian value. The writer has two of these tiles that have been in constant service for many years.

This problem may be varied by using a heavier gauge metal and saw piercing a design instead of raising a dotted pattern, if the metalworker prefers to do so.

FOGGED FILM FOR EYE PROTECTION

GLENWOOD CUMMINGS
Student, Industrial Arts Department
Los Angeles State College
Los Angeles, Calif.

If you've been wishing for a simple, permanent, clean method of protecting students' eyes during welding demonstrations, *fogged* film provides an ideal solution.

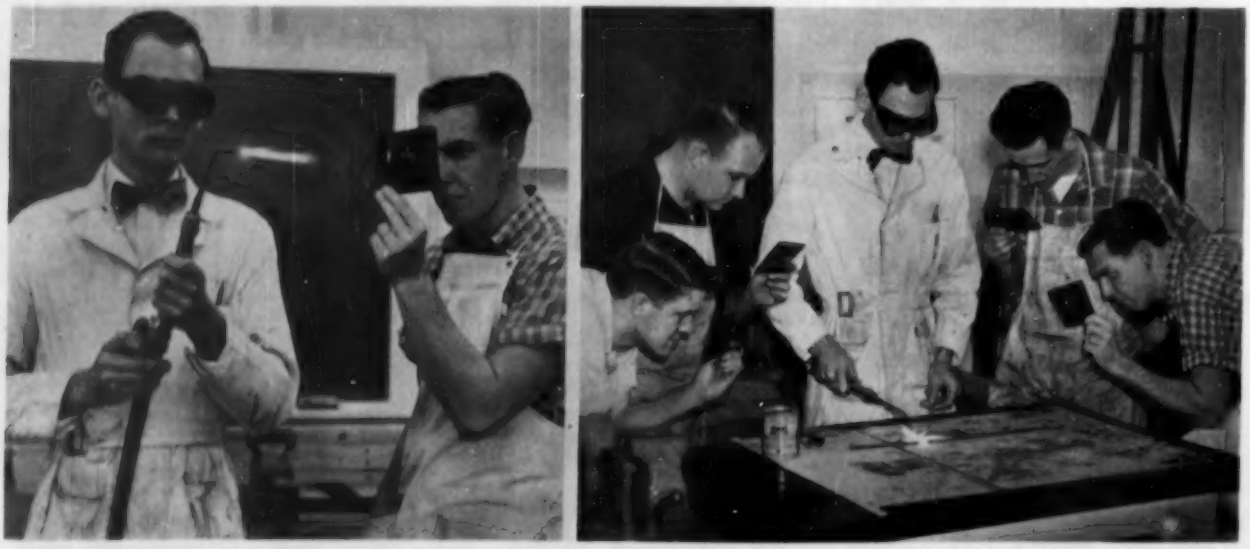
Unlike smoked glass, *fogged* film is permanent. It will not break, you need to prepare it only once, and there is nothing to rub off on students' hands or clothing.

Even if you have no photographic knowledge or equipment, fogging film is a simple process. Get a box of 4 by 5-in. cut film in any photographic supply store. Ask for cut film with an acetate base; it does not curl and does not ignite easily. Since the film is to be opened in the light there is no need for a darkroom. Just open the box in either daylight or incandescent light, remove the light-tight wrapping and the sheets of black paper between the films, and then shuffle the films by rotating top piece to bottom with the emulsion toward the light to insure even exposure. You are then ready to develop the film to the proper density.

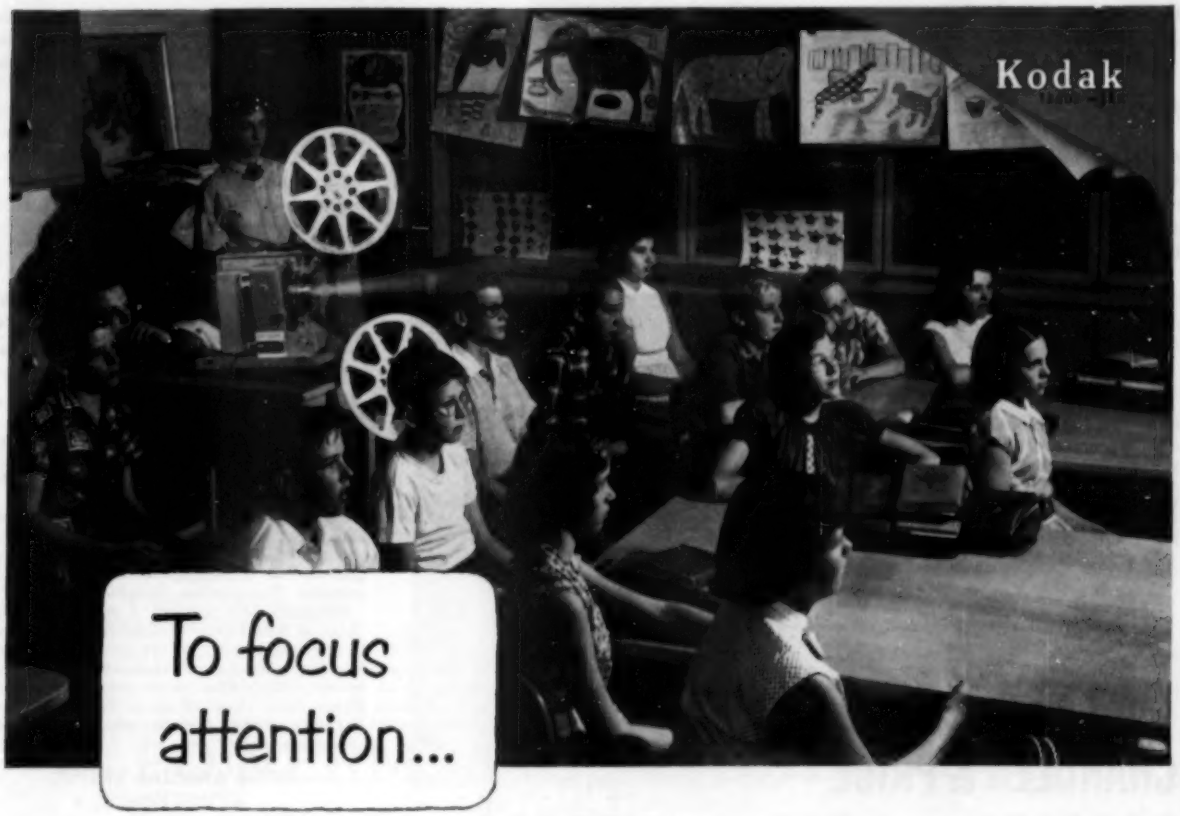
Necessary chemicals may be purchased in inexpensive foil packages containing developer, short stop, and fixing bath. Processing is easily done in small trays.

As a preliminary step it is advisable to rotate the films in plain water first to prevent them from sticking in the developer. For ease of handling it is suggested that no more than six pieces of film be proc-

(Continued on page 12A)



A general metal instructor in the industrial-arts department, Los Angeles State College, shown demonstrating the adjustment of the torch to a student using "fogged" film for eye protection, and at right, shown giving a welding demonstration to students using "fogged" film for eye protection



NOTICE the rapt attention and easy concentration of these youngsters. They're *basking* in their lesson—soaking it up easily and comfortably.

Part of the secret is smooth, quiet projection . . . crisp, brilliant screening. To deliver these qualities, Kodascope Pageant Sound Projectors—and *only* Pageants—offer you all these features.

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3. ***Corner-to-corner sharpness!*** For clear, easy-on-the-eye screenings, you need pictures that are sharp all over. And so, Pageant Projectors have a unique field-sharpening element built right into the standard lens. This special extra element eliminates the troublesome field curvature existent in conventional projection lenses and makes possible needle-sharp focus, edge-to-edge and corner-to-corner.

4. ***Sound focusing!*** For optimum fidelity from *all* types of film—"dupes" *and* originals—you have to adjust the scanning beam to compensate for the different sound-track positions. The Pageant's Fidelity Control enables you to do this *exactly*.

5. ***Comfortable sound!*** Clear, adequate, comfortable sound is no problem with a Pageant. This is because rated wattage means *deliverable power*, and because the speaker has more than ample capacity to handle this power.

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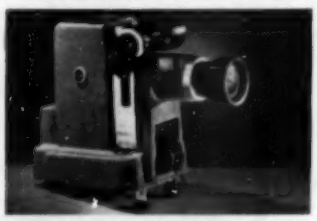

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It's completely new! And it has the smoothest, surest, fastest film-advance ever designed!

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Adrian Bos
Culver's, Phoenix, Arizona

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Mrs. Hazel C. Sherrill
Calhoun Company, Atlanta, Georgia

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- ☐ **Kodascope Pageant Sound Projectors, 16mm.**
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ORGANIZATION_____

STREET_____

CITY_____ **STATE**_____
(Zone)

FOGGED FILM FOR EYE PROTECTION

(Continued from page 204)

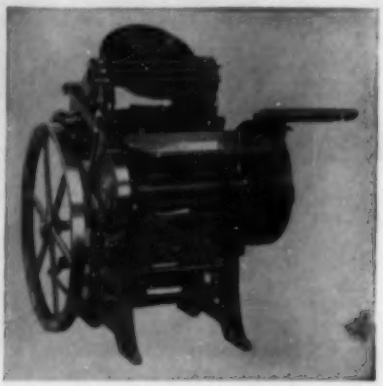
essed at a time, and that agitation take place by rotating the films bottom to top. Use the same agitation in the short stop and fixing bath. After the film is fixed, wash it from 30 minutes to an hour in a tray with running water, or simply change the water in the tray every five minutes for an hour. Be sure that films get plenty of agitation while in the wash to insure removal of all chemicals. Films may be dried by hanging them by the corners with clothes pins.

Since photographic film may be developed to almost any density, it is a simple matter to control the darkness of the film by the length of time in the developer. A test may be made by cutting one piece of film into four strips and developing the strips each a different length of time. Thirty seconds, one minute, two minutes, and four minutes give a good spread to choose from. It has been found that a density somewhat less than that in welding goggle lenses is good, since in group demonstrations the students are at varying distances from the intense light of the torch.

For those people with the necessary equipment, there are more precise methods of controlling the density of the film. Some of these ways are: exposing the film by photographing an evenly lighted white surface; exposing the film in a contact printer; using the light from the enlarger, or turning a white light on in the darkroom at a standard distance and length of time. However, these methods of exposure necessitate developing the film in the darkroom to maintain control of the process.

By whatever method, *fogged* film makes welding demonstrations clearer and safer.

C&P NEW SERIES PRESSES These presses in sizes of 8x12, 10x15, 12x18 and 14½x22, provide the student with equipment that furnishes all practical requirements of hand fed press operation. May be equipped with flywheel, belt and platen guards. Also furnished for treadle operation instead of motor drive.



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C & P presses and paper cutters have been standard equipment in commercial plants and schools for over 50 years. So, the selection of C & P equipment for printing classes places before the students *practical* equipment exactly as used in commercial practice in the entire printing industry.

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"HANDBOOK OF PLATEN PRESSWORK" is one of the outstanding aids to printing furnished without charge to printing instructors. If you do not have a copy, just request one.

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ASSOCIATION NEWS

(Continued from page 6A)

In the afternoon sectional meetings, Raymond Cornwell, instructor of industrial education at Stout, described techniques to "Vitalize Bulletin Boards."

Edward McMahon, a Stout Institute graduate, who is now director of audio-visual services at Mankato State Teachers College, pointed out techniques of obtaining or developing "Inexpensive Graphic Materials."

Delegates also devoted a session to "Previews of New Films." Taking part were David P. Barnard, director of the audio-visual center at Stout and general chairman of the conference; Earl Ellis of Coronet Instructional Films; and C. J. Krumm of Encyclopedia Britannica Films. A coffee hour concluded the conference.

FIFTH ANNUAL SPRING CONFERENCE

The Industrial Education Clubs of Virginia held their spring conference on Saturday, April 2, 1955.

The chairman of the morning session was Fred Woehr, Hopewell, Va.

Walter I. Griggs spoke on "Electricity in Industrial Arts."

Paul Dugger, Bristol, Va., was chairman at the afternoon session at which a representative of the Ford Motor Company gave a talk on the Ford Industrial Arts Awards.

Dr. Gerald Baysinger gave a fine address on "How About Being a Professional Teacher."

K. A. Schneider, Richmond, Va., was toastmaster at the evening banquet.

The main speaker on this occasion was James A. Brownlow, president, metal trades department, American Federation of Labor, Washington, D. C.

NEW EPSILON PI TAU CHAPTER

Alpha Upsilon Chapter of Epsilon Pi Tau, honorary industrial education fraternity, was established Saturday, March 26, at Fairmont State College, Fairmont, W. Va.

The initiating team included William H. Clark, Jr., Charles M. Fisher, Charles M. Bittner, Ralph L. Keller, Elwin L. Kerr, of the Psi Chapter at State Teachers College, California, Pa., and Dr. William E. Warner, professor of education at Ohio State University.

The 12 charter members of the new chapter are: Robert Clarke, James Crisman, Walter Eversole, Melvin Foulds, Earl Hayes, James Kantor, George Lange, Charles McKevitt, Arnold Mauersburg, Ossie Santacroce, John Skrypak, and Henry Zwiener.

Among distinguished guests who were present were: Dr. DeWitt Hunt, industrial arts representative to the United States Office of Education; Dr. Delmar W. Olson, professor of industrial arts, Kent State University, Kent, Ohio; and representatives from the West Virginia Board of Education.

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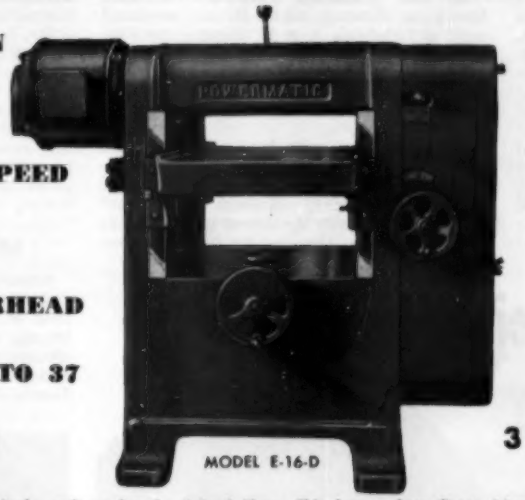

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Personal News

ROY HORACE JENKINS DIES

Roy H. Jenkins, pioneer industrial-arts teacher at Humboldt State College, Arcata, Calif., died on March 9, 1955. He was both friend and professor of industrial arts from 1915 until his retirement from active service in 1953. Mr. Jenkins was in failing health during the past five years and he fell while walking on the campus about a year ago and broke a hip. He had not fully recovered from this accident at the time of his death.

Mr. Jenkins began his teaching in Oskaloosa, Iowa, and then spent a short time in the mining town of Wallace, Idaho. After returning to his first school for another year, he went to California where he taught at Merced and Monterey before going to Humboldt Normal School as it was known at that time. In 1950 the new industrial-arts building was built and named in his honor. Jenkins Hall stands on the site of his first clay pits.

He was graduated from Central State Normal at Edmond, Okla. He did advanced work at Oklahoma A. & M. College, the University of Chicago, Oswego State College, Columbia University, Stanford, Calif., Arts and Crafts, and at Oregon State College. He was granted the M.A. degree at Oregon State in 1927.

Mr. Jenkins' ingenuity, born of unselfishness, patience, and low budgets, sustaincd the program in his field of work, where the looms, potters wheels, kilns, and much of the other equipment was built by him or paid for from his own pockets. The clay for his kilns came from the campus or nearby hillsides and the wool for weaving was carded by Swiss families in the region. Local lumber mills furnished most of the necessary supplies for the woodshop and the beaches gave up cutting materials for the lapidary unit. Because of his ability to achieve the artistic from available sources he was called upon many times to teach in summer schools and camps.

Mr. Jenkins' advice was highly regarded and his articles were in demand by such magazines as *Industrial Arts and Vocational Education, Popular Science, School Arts, Ceramic Age, Design, Science and Mechanics,* and *Home Craftsman,* for whom he contributed nearly fifty items for publication. His authority was recognized in the field of ceramics and he prepared, and had published his book, *Practical Pottery for Craftsmen and Students,* in 1947.

SAMUEL L. FICK HONORED

Samuel L. Fick, chief of the Bureau of Industrial Education, California State Department of Education, was cited for special honor by the members of the Ship at the annual meeting of the California Industrial Education Association held in San Diego, Calif., on March 18 and 19.

This photograph shows Mr. Morris Stone, deck officer of the California Ship, presenting to Mr. Samuel L. Fick, chief of the Bureau of Industrial Education, the Ship's Citation for outstanding leadership.

The engraved bronze plaque which was presented to Mr. Fick by Morris Stone, deck officer of the Ship, reads as follows:

Citation
To
Samuel Leonard Fick

Native Son of California, Craftsman, Teacher Educator, Supervisor and Administrator of Industrial Education.

For your creative leadership in the field of Industrial Education and for your contribution to the educational and vocational advancement of youth and adults, we of the Ship present this citation in recognition of more than three decades of loyal, unselfish devotion in the field of education.

members of
THE SHIP

California Industrial Education Association Annual Convention, 1955

FRED JACKSON RETIRES

Fred Jackson, Crawfordsville, Ind., has retired from teaching after devoting more than forty years to this profession.

Mr. Jackson is a graduate of Indiana State Teachers College, with some undergraduate work at Indiana University and Bradley University. His teaching experiences began in

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1. Students learn by seeing or doing . . . they validate electrical principles by constructing their own operating assemblies. Crow method permits students with no mathematical background to grasp the subject readily.

2. Equipment is ready for use immediately in conjunction with your present shop or science courses. No complicated wiring or installation problems . . . no floor space or floor load difficulties.

3. Accompanying each ELECTRI-KIT is a fully illustrated text-manual written in clear non-technical language. It organizes the course for the instructor . . . relieves him of tedious, time-consuming preparation and planning.

4. All parts are precision made and conform to highest engineering standards. They do the work of equipment which, if purchased separately, would cost many times as much, and they do it both safely and accurately.

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Green County where he taught in the grade schools from 1905 to 1912 with two years out for further schooling. In 1914 he moved to Muncie, where he taught in the grade, junior high, and high schools until he moved to Crawfordsville in June of 1954. While at that city he taught such subjects as wood shop, machine shop, sheet metal, arithmetic, and for the last several years mechanical and architectural drawing. At his retirement he was chairman of the Crawfordsville industrial-arts department.

♦ Dr. Frank J. Woerdehoff, from the Division of Vocational Education, Madison, Wis., has joined the teacher education staff at Purdue University.

Dr. Woerdehoff is engaged in improving the curriculum and apprenticeship instructional material.

♦ W. A. Williams of the vocational agriculture staff, was appointed administrative assistant in vocational education, at Terre Haute, Ind.

Mr. Williams was born in Decatur County in 1908 and graduated from Greensburg High School. He received his B.S. degree in agriculture from Purdue University in 1931. He taught vocational agriculture for three years in Henry County. Following this experience, he returned to Purdue University and spent one year in graduate study work and received his M.S. degree in 1935.

Following this, he served as principal and agriculture teacher in Knox County for four years. In 1939, he went back to Purdue University and spent half time as a teacher trainer in agriculture and the other half time as a graduate student.

During World War II he served as state supervisor of agriculture in charge of Food Production War Training. He was called to service in December, 1942, and spent one year overseas and a large portion of that time was in combat duty. Following this, he served in the headquarters in Paris, France, in the information and educational division.

Following his discharge from service, he joined the Veterans Administration staff located at Purdue University and in 1947 he was invited to join the Department of Public Instruction as associate state supervisor of agriculture in charge of institution on-the-farm training.

Recently he was promoted to assistant state supervisor of agriculture education, and on December 15, 1954, he was appointed to his present position.

♦ Tuskegee Institute, Tuskegee Institute, Ala., has signed a contract with the Indonesian Government to offer technical assistance in the field of industrial education to the people of Indonesia. This project is sponsored by Foreign Operations Administration.

At the present time they have sent the following personnel to Indonesia: E. P. Westmoreland, chief adviser in Indonesia; W. W. Bearden, teacher trainer — woodworking; Jehu L. Hunter, teacher trainer — auto mechanics; Paul S. Lynch, teacher trainer — Diesel engine; Tamlin Antoine, teacher trainer — machine shop; James A. Parker, teacher trainer — industrial science; Silas R. Kennedy, equipment installation specialist — auto mechanics; George R. Drevenak, Diesel engine installation equipment specialist; Charles T. Greene, machine shop equipment installation specialist; and Lawrence B. Hastings, woodwork equipment installation specialist.

♦ Parnik (Barney) Hazarian is adviser to the school newspaper, and printing instructor at Muscatine, Iowa.

♦ Donald C. Ingram is the general metals instructor at Austin, Minn.

♦ Herbert N. Pringle, Jr., is teaching graphic arts and drafting at Walter French Junior High School in Lansing, Mich.

♦ Harry Kerwin has been given a two-year assignment as director of vocational education, Benghazi, Secondary School of Trades, Libya, North Africa.

His mailing address is: Harry Kerwin, U.S.O.M., c/o American Embassy APO No. 231, c/o Post Master, New York, N. Y. (Director Vocational Education at Foreign Operations Mission, Benghazi, Libya, North Africa).

♦ Lee C. Deighton has joined Science Research Associates, Chicago, Ill., as eastern editorial manager. He will have charge of the development of a textbook list and will open a new office for the company in New York City.

♦ Jay Doblin, New York City designer, has been appointed director of Illinois Institute of Technology's Institute of Design.

He will asume leadership of the design school in September when it moves into a new building being constructed on Illinois Tech's south side campus. The building also will house the IIT department of architecture and a newly formed department of regional and urban planning.

♦ Delmar D. Owens is the superintendent of buildings and grounds for the Durham City Schools, Durham, N. C.

♦ George Bowers is the abrasive engineer for the Carborundum Company Industrial Division.

♦ Carl J. Haase is the rehabilitation supervisor in La Crosse, Richland, Monroe, Vernon, Crawford, and Grant counties, Wis.

♦ S. S. Wick, superintendent of trade and industrial education for Minnesota for the past 11 years, has been appointed to succeed Harold Ostrem as assistant state director of vocational education.

Sheldon's larger, wider "Zero Inspection", Tapered Roller Spindle Bearings save you money by making these lathes better in 6 ways.

Write for G-55 catalog showing new 10" 11" and 13" swing, bench, cabinet and pedestal mounted Sheldon Precision lathes.

1st They *meet* Sheldon's high standard for accuracy — each bearing has a run out limited to .00015".

2nd They absorb thrust and radial loads beyond requirements — basic rating on front bearing at 500 R.P.M.
for radial loads.....3540 lbs.
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3rd They *end* costly bearing maintenance — require only a fractional turn of bearing take-up after long periods of service.

4th They *hold* the spindle in rigid alignment while permitting it to turn freely at high or low speeds — the line contact between rolls and races, and the opposing taper design, preclude lateral movement or end play.

5th They *minimize* friction — smooth mirror finished rollers and races running in light oil, deliver more horsepower at the Spindle Nose and lower power costs.

6th They *increase* work capacity. Larger than similar type bearings on other lathes in this price range, permit full size "industrial" projects and give students the "feel" of a full power, full size industrial lathe.

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News Notes

METHODS OF TEACHING INDUSTRIAL SUBJECTS

A brand new 35mm. color sound filmstrip entitled Methods of Teaching Industrial Subjects which enumerates the commonly accepted methods of teaching industrial subjects has been released by the Industrial Education Department, Division of Extension, The University of Texas. The filmstrip, vivid in color and realism, is an outstanding job from start to finish.

The sound filmstrip contains 52 frames, and the commentary prepared by a professional narrator runs approximately 15 minutes. Purpose of the filmstrip is to acquaint industrial teachers with the teaching methods in common use. Emphasis is placed on naming the methods and showing examples of their use. The pictures used are from several shops and related subjects fields.

The filmstrip in its preparatory stages was shown at the National Association of Teacher Educators meeting in San Francisco during the December American Vocational Association gathering, and it met with immediate acclaim.

Narration for the color filmstrip Methods of Teaching Industrial Subjects is available on record or on tape. A fiber carrying case is furnished with the record. No case is required for the tape which is shipped in the manufacturer's original hinged box.

The Industrial Education Department, Division of Extension, The University of Texas, invites inquiry about the film. A brochure explaining all pertinent items of detail is available upon request.

♦ For the twentieth consecutive year, the National 4-H Electric Awards Program will provide county, state, and national awards to recognize the outstanding electric achievements of 4-H Club boys and girls throughout the United States. The Westinghouse Educational Foundation is donor of the awards.

The program, which is conducted by the Extension Services of the State Agricultural Colleges and the United States Department of Agriculture, is arranged by the National Committee on Boys and Girls Club Work.

Details on the 4-H Electric Program awards are covered in a 4-page leaflet published by Westinghouse and the National Committee on Boys and Girls Club Work.

For copies of this leaflet write Westinghouse Farm Youth Activities, P.O. Box 2278, Pittsburgh 30, Pa.

♦ The nation's top farm youths in the 19th annual 4-H Electric Program were awarded college scholarships on November 30 during the Westinghouse banquet at the National 4-H Club Congress, Chicago, Ill.

Five boys and one girl were presented $300 scholarships by Mark W. Cresap, Jr., vice-president and assistant to the president of Westinghouse Electric Corporation. The winners were: Joe Young, Rt. 1, Montgomery, Ala.; Wesley Jacobsen, 300 Monte Vista Lane, Petaluma, Calif.; Robert Ress, Rt. 1, Coffeyville, Kans.; Charles Canada, Rt. 1, Guilford College, N. C.; Mary Ann Foster, Poquoson, Va.; Paul Davis, 308 Riverside Dr., South Charleston, W. Va.

♦ Vocational schools teaching woodworking and house construction will find a valuable teaching aid in a handbook recently issued by the U. S. Department of Agriculture.

L. O. Anderson and O. C. Heyer, engineers at the U. S. Forest Products Laboratory, have written a handbook called "Wood-Frame House Construction." In it they discuss sound principles of wood-frame house construction based on practical experience and on 44 years of research on wood.

House construction, from staking and laying out to painting, is illustrated by more than 150 detailed drawings. The authors deal mainly with established methods of construction. They point out that while details of construction may vary in different localities, the principles are the same.

The handbook, designated Agriculture Handbook No. 73, can be obtained from the Superintendent of Documents, Washington, D. C., for 65 cents.

♦ More than 175 motion pictures ranging in subject matter from raising a dog to brazing aluminum are described in *Selected Free Films*, a 16-page booklet just issued by Association Films, Inc. The films, available for loan to clubs, industries, schools, churches, and other community organizations, may be borrowed from Association Films' regional film libraries.

Copies of *Selected Free Films* may be had free of charge from Association Films' executive offices at 347 Madison Avenue, New York 17, N. Y., or from the company's regional film exchanges in Ridgefield, N. J. (Broad at Elm), Chicago (79 E. Adams Street), Dallas (1108 Jackson Street), and San Francisco (351 Turk Street).

♦ Because of the many requests received from Architectural Drafting instructors for copies of its copyrighted *House Parts Dictionary*, The Homograf Company has prepared a limited number for free distribution.

To obtain copies for members of architectural drafting classes, send your name, address, and number of copies required to: Homograf, East Detroit, Mich.

In the school shop as in industry, this rugged Logan "6560" performs impressively on every operation. On heaviest cuts, or at maximum speed, it turns the work *smoothly*, quietly, with precision results. Superior performance is designed, engineered and built into it.

The Variable Speed Drive provides instant spindle speed correction. The oversize spindle, with 1⅛" bore, turns on a ball bearing mounting that needs no adjustment within the full range of 38 to 1200 rpm. The bed is a wide, deep special alloy casting, extra heavy and resistant to both internal and external stresses. The two V-ways and two flat ways are precision ground. Extra strength and weight throughout, plus dynamic balancing of the complete lathe practically eliminates vibration. Moderate price and low cost operation make the "6560" outstanding in economy as well as in precision performance. Write for Bulletin 14-L, giving a full description.

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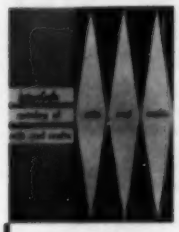

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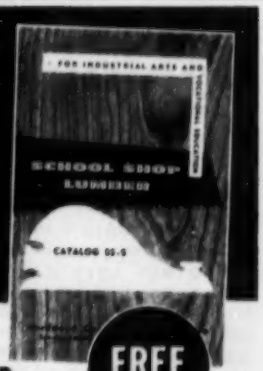

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EDUCATIONAL LUMBER DIVISION
P. O. Box 1091, Dept. E
ASHEVILLE, N. C.

New Publications

Elements of Television Servicing

By Abraham Marcus and Samuel E. Gendler. Cloth, 587 pp., 5⅞ by 8⅝ in., illus., $5.50. Prentice-Hall, Inc., New York, N. Y.

A text on how to service television receivers. It shows how the beginner can acquire the knowledge and skill to analyze the troubles that arise and plan the method and procedure for correcting them.

The authors describe the general principles of television transmission and reception, the television signal and receiver, TV antennas, installing the receiver, field trouble shooting, bench servicing, the heater circuit and low-voltage power supply, the horizontal sweep and high-voltage sections, the vertical sweep section, the synchronization section, the picture-signal path, the sound-signal path, the picture tube, alignment, color television, color TV receivers, and servicing the color TV receiver.

The book also contains a glossary of TV, and color TV terms.

Creative Handicraft

By Ira C. Madden. Cloth, 224 pp., 8⅝ by 11¼ in., illus., $3.75. The Goodheart-Willcox Co., Inc., Publishers, Chicago, Ill.

A fine book on elementary craftwork. It helps the young students to become familiar with the use of tools, materials and finishes, and aids them in acquiring the right attitudes toward those with whom they work.

The book contains quite a number of simple well-designed projects most of which will please the young handcrafters.

Flight Handbook

Compiled by the Staff of Flight, and edited by Maurice A. Smith, D.F.C. Cloth, 282 pp., 5⅝ by 8⅝ in., illus., $6. Philosophical Library, New York, N. Y.

This is the fifth edition of this book on aircraft. This edition has been rewritten and enlarged.

It describes the principles of aerodynamics, aircraft structures; landing gear, aircraft controls; fixed-wing powered aircraft; gliders and sail planes; rotorcraft; balloons and airships; piston engines; gas turbines; ramjets, pulsejets, and rockets; aircraft power plants; airscrews; auxiliary power systems; cabin equipment and furnishing; aircraft armament; , instruments; and navigation.

The book contains 229 illustrations.

Making Things of Plastic

By Lauton Edwards. Cloth, 191 pp., 5⅞ by 9 in., illus., $3.75. Chas. A. Bennett Co., Inc., Peoria, Ill.

This helpful book on plastics presents well-designed pen stands, bill files, book ends, bowls, boxes, bracelets, candleholders, cane handles, cigarette boxes, clock lamps and stands, display racks, door knockers, trays, articles with flower carving, gavels, key chains, laminating plastics, lamps, lazy Susans, molding hot plastics, name plates, necklaces, paperweights, penholders, picture frames, planters, plaques, rings, salt-pepper shakers, school emblems, serving table, smoking stand, coffee and serving tables and trays.

It also explains how to saw with power tools; also how to use power tools for sawing, sanding, and buffing.

Farm Shop Skills in Mechanized Agriculture

By Harry O. Sampson, Albert S. Mowery, and Harold L. Kugler. Cloth, 395 pp., 5¾ by 8½ in., illus. American Technical Society, Chicago, Ill.

An excellent textbook explaining how to locate and build a farm shop, how to equip it with hand and power tools, and how to paint it.

The book also gives directions for mixing, finishing, and curing concrete for farm construction.

The working with metals, soldering and pipe fitting and welding are also described.

Other chapters explain to the farmer how to care for his electrical equipment, and maintain his farm machinery, and fit shop and farm tools.

The book also contains a number of detailed instructions for making useful projects for the farm, home, and barn, such as workbenches, anvil bases, lumber and metal storage racks, hand and power saw filing vises, welding tables, sawhorses, and stepladders, tool and nail boxes, picnic table, farm gates, type A hog house, feed scoops, and feed carts.

Elements of Radio Servicing

By William Marcus and Alex Levy. Cloth, 566 pp., 6¼ by 9¼ in., illus. McGraw-Hill Book Co., New York, N. Y.

This is the second edition of this text. The authors have revised this material so that the new practices and circuits that have been developed since the first edition was published are fully described.

New chapters have been added on battery and three-way portable receivers, and on frequency-modulation receivers.

A special series of six filmstrips to correlate with and to illustrate specific items in this book have been prepared to help the teacher clarify the subject to the student.

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13 "GREENLEE 22" SOLID-CENTER AUGER BITS IN METAL HOLDING PANEL

Here's the handy, complete auger bit set designed especially for shops. Provides a practical assortment of bits and keeps them in order for you.

Panel has a holder for each bit with size clearly marked. Makes it easy for students and other workers to select the bits they need . . . *then return them to their places* so the next user knows where to find them!

Set includes 13 famous "GREENLEE 22" Solid-Center Auger Bits in sizes 4/16" to 16/16". These bits bore smoothly, accurately and have solid-center design which gives extra strength and provides positive, fast chip clearance. All are "Induction Heat-Treated" for uniformity, long life.

Solidly built metal holding panel has a sturdy metal easel and two knockout holes at top so that it may either be used standing up on a workbench or hung on the shop wall. Equip your shop with this handy, high-quality GREENLEE unit. At leading hardware and building supply dealers.

Write for free Catalog 35-H with information on the complete line of high-quality hand tools.

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professional quality
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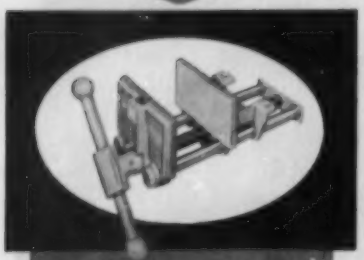

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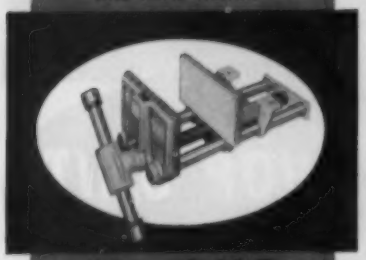

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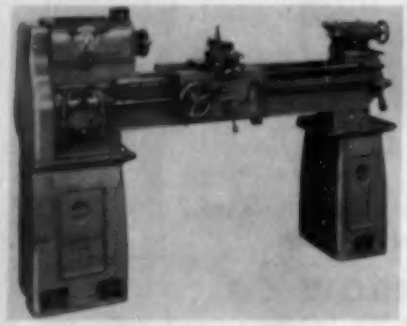
SHOP EQUIPMENT NEWS

(Continued from page 27A)

other features found in the Cincinnati Tray-Top.

For schools desiring to train their students on the tools industry uses, the new Cincinnati Tray-Top • ette provides 12 spindle speeds in geometric progression with an all-geared transmission.



New 12½-in. Tray-Topette

A direct-reading, 3-lever, color match spindle speed shift mechanism is used. The extra large spindle, with long taper key drive nose, is rigidly mounted in 3 precision antifriction bearings.

The totally enclosed quick change box is arranged for 48 thread and feed changes, and it also incorporates a leadscrew reverse. It is automatically lubricated.

Cabinet legs at both ends provide ample storage space, and the unique *Tray-Tops* are safe parking areas for mikes, wrenches, gauges, and other shop necessities.

(For Convenience Circle Index Code 0615)

PECK & HARVEY ISSUES CATALOG SE55

Peck & Harvey Manufacturing Corporation has issued a new catalog SE55, which features a complete line of custom-built stainless steel sinks, tanks, trays, and accessories available at standard stock-unit prices. It offers free darkroom layout service without obligation.

Catalog SE55 covers stainless steel heavy duty sinks; refrigerator sinks; sinks with storage cabinets; thermostatic water mixer; general purpose sinks; standard sinks and setups; small compact sink setups; hospital and chemical lab sinks; temperature regulating sinks; trays for developing, fixing, washing; film processors; water jackets for cut film and plates, and for color processing; cut film tanks; deep roll processing equipment; cylindrical and square storage tanks for storing, mixing, and measuring chemicals; beakers, graduates, and buckets. It shows a variety of special stainless steel setups provided by Peck & Harvey.

(For Convenience Circle Index Code 0616)

FRANK PAXTON PAX-PAKS SHIPMENTS

Frank Paxton Lumber Company can now furnish packaged units of both furniture lumber and plywood in 12 beautiful selections. These package units, called Pax-Paks, are priced individually and delivered prepaid throughout the United States.

Pax-Pak lumber selections are packaged in random widths and lengths, 6 in. and wider, 6 ft. and longer, and are surfaced two sides and grade clear one face and better.

(For Convenience Circle Index Code 0617)

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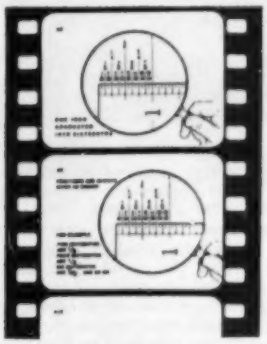
NEW STANLEY SHOP FILM STRIP

Because of the increased use of visual aid instruction in schools, the Educational Department of Stanley Tools is now offering the second of a series of Stanley Film Strips, *Measuring, Testing and Marking Tools for Woodworking*, for use in elementary, junior high, senior high, and vocational schools. They have been produced to supplement shop demonstrations, charts, and other media used by the teacher to furnish the type of instruction that stays with the student.



Stanley Film Strips on Measuring

The first strip of this new series is designed to help teach 16ths of an inch graduations. Other strips help teach the use of bench, folding, zigzag, and pull-push rules, squares, bevels, gauges, dividers, and marking tools, etc.

Film strips are 35mm. black and white safety film and can be shown with any standard film strip projector in a semidarkened or ordinary lighted room.

(For Convenience Circle Index Code 0618)

NEW SAX-CRAFTS CATALOG

A new 60-page catalog covering all handicrafts, has been announced by Sax-Crafts, division of Sax Bros., Inc.

The new catalog is designed to interest purchasers in all handicrafts, and is designed to serve as a *one-stop* purchase tool for those who are interested in a number of varied activities.

When Sax Bros. Inc., was founded in 1910, it restricted itself to leathercraft supplies. The company still maintains one of the largest stocks of leathers in the country, including many rare items. In recent years, however, the company has moved in the direction of servicing a variety of handicrafts. The present catalog covers supplies, kits, tools and books for not only leathercraft, but ceramics, basketry, metalcrafts, woodenware, felt and cork crafts, copper enameling, and many others.

Copies of the catalog are available upon request.

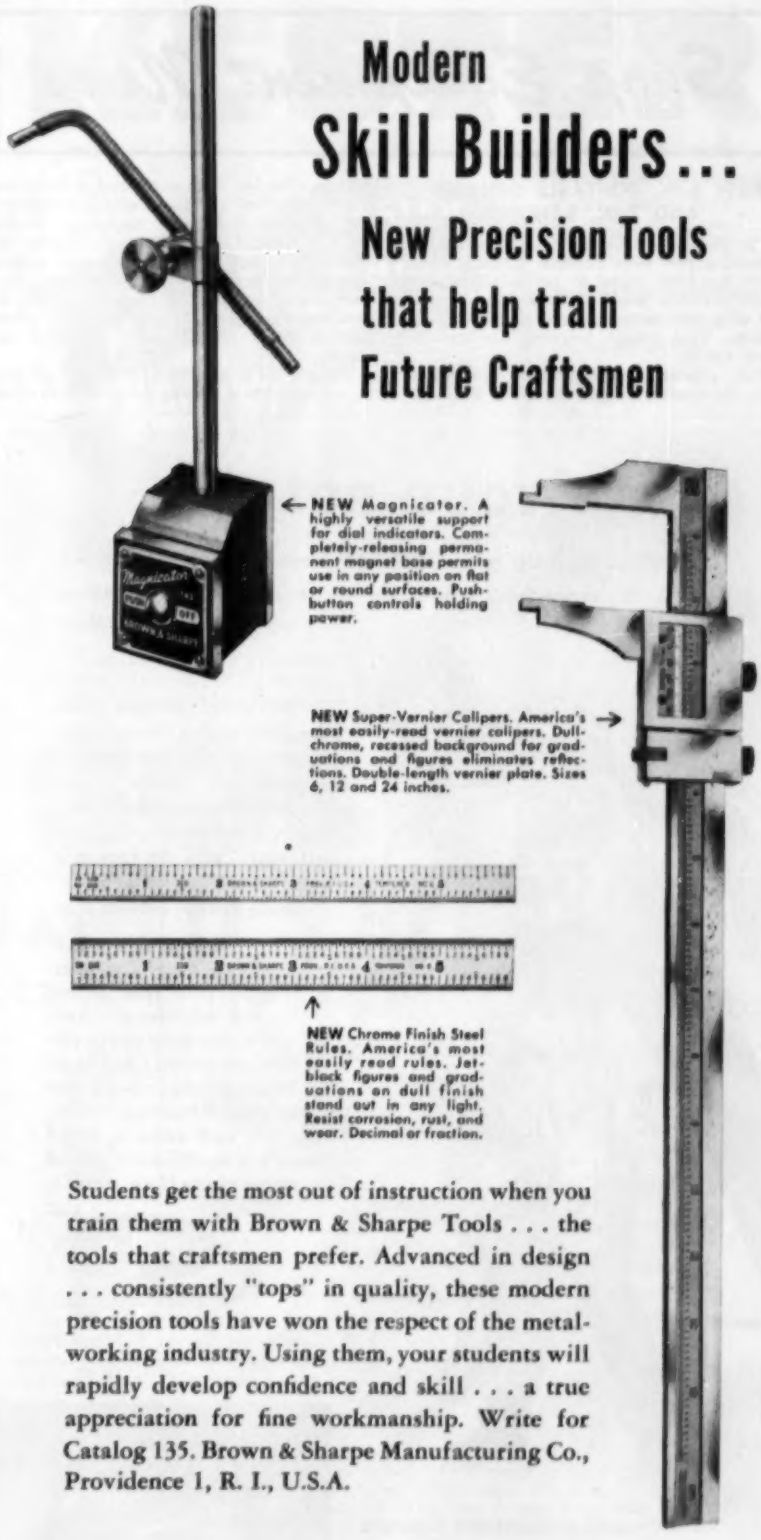
(For Convenience Circle Index Code 0619)

EXPANDING FACILITIES

The Columbian Vise & Manufacturing Company has expanded its vise manufacturing facilities by an addition of a new 10,000 sq. ft. building at its Cleveland plant.

New sales department offices are also provided in a second floor building wing.

Addition of this new building increases the total Cleveland plant area to over 50,000 sq. ft., all devoted to the manufacture of machinists' vises, pipe vises, hydraulic vises, home workshop vises, and other items in the Columbian vise line.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NEW Chrome Finish Steel Rules. America's most easily read rules. Jet-black figures and graduations on dull finish stand out in any light. Resist corrosion, rust, and wear. Decimal or fraction.
Students get the most out of instruction when you train them with Brown & Sharpe Tools . . . the tools that craftsmen prefer. Advanced in design . . . consistently "tops" in quality, these modern precision tools have won the respect of the metalworking industry. Using them, your students will rapidly develop confidence and skill . . . a true appreciation for fine workmanship. Write for Catalog 135. Brown & Sharpe Manufacturing Co., Providence 1, R. I., U.S.A.
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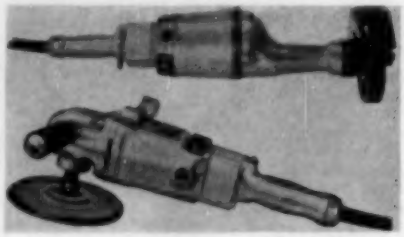
Shop Equipment News

NEW 6-IN. PORTABLE GRINDER AND 7-IN. SANDER

The Black & Decker Mfg. Co. has just announced a new 6-in. Portable Grinder whose power has been upped 85 per cent over that of the previous model through the introduction of a new motor tailored to grinding operations. Tool weight, however, has been reduced 1½ lb.

This grinder is designed for continuous duty, incorporating lubricant-sealed ball bearings. In addition, its heat-treated helical gears give a smoother and more efficient transmission of power from motor to spindle. A new type centrifugal fan produces extreme air velocity through the commutator section, thereby causing the motor to run cool. Further, this strong air flow keeps the motor almost entirely free of abrasive dust and carbon. Exhaust air is directed away from the operator.

The grinder is 24½ in. over-all, weighs 18¼ lb. net, and has a spindle speed of 3750 r.p.m.



Black & Decker 6-in. Portable Grinder and 7-in. Sander

An improved rear handle, affords a more ample gripping area, plus good tool balance, which reduces operator fatigue. This tool is available for either 115 or 220-volt a.c. or d.c. operation.

This firm also has perfected a new 7-in. sander. This tool possesses 20 per cent more power than its predecessor, yet its weight has been reduced by 20 per cent.

A new type centrifugal fan affords far greater air velocity through the commutator section, keeping the motor cool and free of carbon and abrasive dusts.

Heat-treated spiral bevel gears give a smooth, constant transmission of power from the motor to the spindle. The Black & Decker universal motor drives the sander at 4250 r.p.m. The unit has a net weight of 10¾ lb., and an over-all length of 17¾ in.

Supplied as standard equipment are a reversible side handle, 3 sanding disks of varying grits, a rubber back-up pad, a clamp washer, a strap metal stand, and a spanner wrench. In addition a complete line of sanding accessories may be obtained as optional equipment.

(For Convenience Circle Index Code 0601)

IT'S YOUR ROLL!

Step Up to a Challenge Proof Press and prove the "Cylinder-Press" principle of reciprocating bed riding on anti-friction rollers.

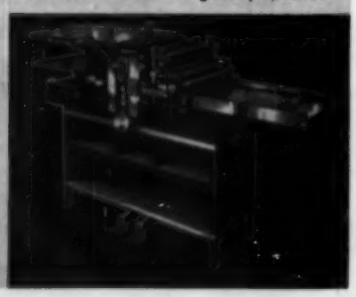
It's easy! Simply place the sheet under the cylinder grippers to the micrometer side guide . . . then let 'er roll! Proofs come out sharp, clear, and clean — always uniform! Press the foot trip to prevent offset on cylinder packing during return trip.

It's easy to see this Challenge "Cylinder Press" principle means real efficiency! And it's also easy to see the complete line of Challenge Proof Presses. Send for the free Challenge catalog — and take a look! There's a model best suited for your proofing needs.

Challenge

TRADE-MARK ®

Challenge Series K Proof Press
Equipped with feed board, delivery board, and zinc galley plate.



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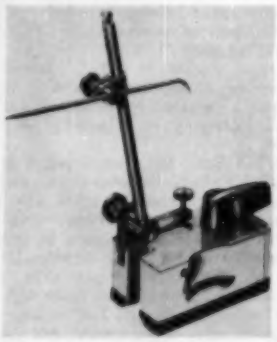
788-G

MAGNETIC BASE SURFACE GAUGE

A new surface gauge, with a magnetic base has been added to the line of Miti-Mite tools manufactured by The Lufkin Rule Company.



Magnetic Base Surface Gauge

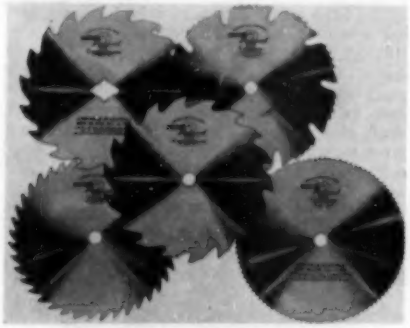
The permanent magnets in the base of this new tool are controlled by an off-on switch. This permits easy positioning, and positive holding after the gauge is in position. The switch in partial off position reduces the amount of magnetic pull so that slight changes in position can be made. The base is precision machined and ground and can be used on a marble surface plate if desired.

The surface gauge has all the fine features of a universal surface gauge, including fine adjustment, full 200 deg. swing of the spindle, and both 4- and 7-in. spindles for a wider range. Attachments are included to permit using the gauge as a dial indicator holder.

(For Convenience Circle Index Code 0602)

NEW DISSTON CIRCULAR SAW BLADES

A new line of quality wood-cutting circular saw blades, has just been announced by Henry Disston & Sons, Inc.



"Preferred" series of wood-cutting circular saw blades available in many sizes and types

Available in sizes from 6 in. to 12 in., inclusive, in six different types — rip, cutoff, planer (combination hollow ground), combination (flat ground), *safe-feed*, and flooring — these quality saw blades are designed for use on all bench or table saws as well as portable electric handsaws.

These *preferred* blades make the maximum use of power, giving faster cutting and better finished wood surfaces with less motor strain.

(For Convenience Circle Index Code 0603)

NEW GYRO-VISE FLUSH BASE

A new Gyro-Vise flush base, which drops

(Continued on next page)

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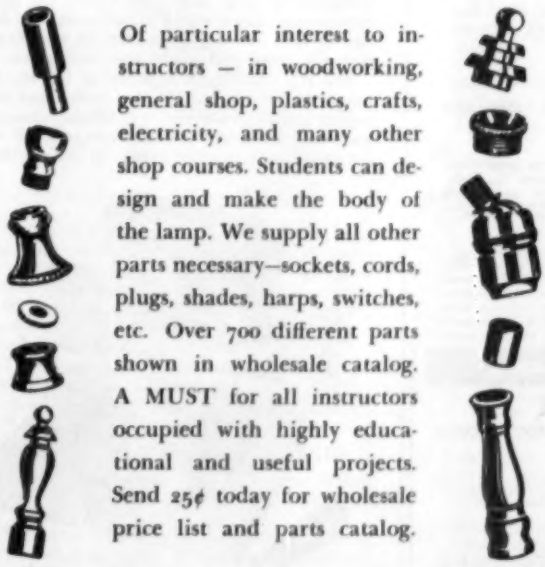

Of particular interest to instructors – in woodworking, general shop, plastics, crafts, electricity, and many other shop courses. Students can design and make the body of the lamp. We supply all other parts necessary—sockets, cords, plugs, shades, harps, switches, etc. Over 700 different parts shown in wholesale catalog. A MUST for all instructors occupied with highly educational and useful projects. Send 25¢ today for wholesale price list and parts catalog.

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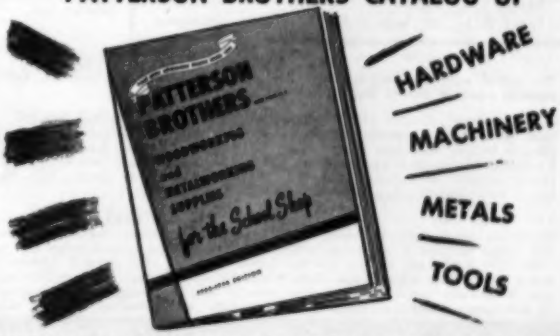

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Patterson Brothers — one of the oldest and most reliable names in the business — is again ready to supply your every shop need with outstanding quality and service.

Write today for the 1955 PB CATALOG!

PATTERSON BROTHERS
SINCE 1848
15 PARK ROW, NEW YORK 38, N. Y.

SHOP EQUIPMENT NEWS

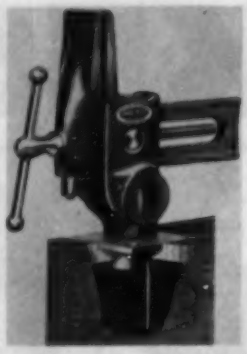
(Continued from previous page)

level with the work surface when not in use, is announced by The Columbian Vise & Mfg. Co.

This special base is designed for applications where it is desirable to keep the workbench or other surface free of obstacles at times when the vise is not needed. By loosening a setscrew on the side of the base, the post drops down level with the surface. It is held there by a retaining rod.

The new base increases the usefulness of Gyro-Vises. The latter operate from — and rotate around — the base, standing upright or lying flat on either side. They turn in a full circle and lock automatically in any desired position when jaws are tightening.

(For Convenience Circle Index Code 0604)



New Gyro-Vise Flush Base

THE NEW BOICE-CRANE
MASTER-MONOTROL*
10-INCH TILTING ARBOR SAW
• CUTS A BOARD PLUMB SQUARE!
• RIPS SUPER STRAIGHT!
• CUTS MITERS THAT REALLY FIT!

33⅓% TO 50% MORE POWER

Heretofore, enough power to cut full 3" hardwood was usually available only in 12-inch saws. In a Master-Monotrol* you have a selection of motors offering from a third to a half more power than others accommodating only small frame motors. Boice-Crane full powering guarantees freer sawing, reduced hazard of accidental kickbacks when freeing stock from a choked blade. The Master-Monotrol is the only 10-inch saw that goes up to 2 H.P.

SPECIFICATIONS

SAW BLADE TRAVEL: 0 to 3⅛"
ARBOR SPEED: 4000 rpm's
CAPACITY: Cuts off 15" wide, 1" thick
Cuts off 13⅝" wide, 3" thick
Rips to center of 6 ft. wide stock
POWER: To 2 HP 3-ph., to 1½ HP 1-ph.
ARBOR: ⅝" dia.
TABLE SIZE: 36" wide x 27½" long with extensions

MEETS EVERY DEMAND FOR CAPACITY, LONG LIFE, STURDINESS

Produces Superior Cabinet Work. Guarantees Permanent Accuracy, even with abusive use.

EXCLUSIVE NEW TYPE TRUNNION

All critical parts, support surfaces, bearings and contacts are oversize, extra rugged. Many parts actually equal in size to those on 12-inch saws.

SINGLE CONTROL FOR POSITIONING BLADE

New Monotrol* saw blade positioning system reduces blade controls to a single large handwheel, plus a height lock and a tilt lock, all mounted on the front — equally convenient for right-handed or left-handed operators! No groping, no out-of-reach controls, fewer accidents, an amazing saving of time on variety work. 5% to 29% faster blade speed. Cuts faster, cleaner, smoother. Up to 44% more ripping capacity without extra attachments.

OTHER NEW FEATURES

Overhung arbor pully for quick belt changing and without tools • Power-packed 3 V-belt drive and larger pulleys • Start-stop switch which accidental manipulation can turn only "OFF," never "ON" • Blade tilt to left — the safest way for right-handed operators • Steel, all-purpose insert serves saws blades, and dado heads as well without constant interchange, and without extra cost • Ground cast-iron fence with entirely new micro-central, and easier tool-proof adjustments • 27 inches maximum fence to blade, 44% more ripping capacity than most 10-inch saws.

Now, there really IS a new and BIG difference in saws.

BOICE-CRANE COMPANY

932 CENTRAL AVENUE TOLEDO 6, OHIO

Please send complete details on the Master-Monotrol.*

NAME.....

SCHOOL.....

STREET.....

CITY & STATE.....

*Tradename Reg.

THE NEW LETTERGUIDE EQUIPMENT

The Letterguide Company announces a new low-cost precision lettering guide.

It offers fast, easy lettering of top quality and maximum flexibility. There are no moving parts and only one simple adjustable arm, and yet the Letterguide Scriber produces clean, sharp, and concise lettering with a great saving in time.

New Letterguide Equipment

With this Letterguide Scriber it is possible to enlarge, reduce, and slant any templet letter. Accurately defined angle-height combinations are made simply and easily and offer a large variety of lettering from one templet.

Letterguide Templets offer a wide range of today's best faces in sizes ranging from ¼ to ⅝ in., and in many styles, up to 2 full inches.

(For Convenience Circle Index Code 0605)

JIG SAW ATTACHMENT FOR ¼-IN. ELECTRIC DRILLS

Recently announced by the Millers Falls Company is their new Dyno-Mite Jig Saw Attachment which easily converts any ¼-in. electric drill into a combination jig saw, hack saw, rip, crosscut, keyhole, and coping saw.

The No. 2140 has a capacity of 1¼ in., in wood, ⅛ in. in metal. It is a useful tool for sawing intricate patterns for brackets, valances, and other decorative or odd shapes in wood, or for sheet metal, weather vanes, etc. No starting

Millers Falls No. 2140 Jig Saw Attachment for ¼-in. Electric Drills

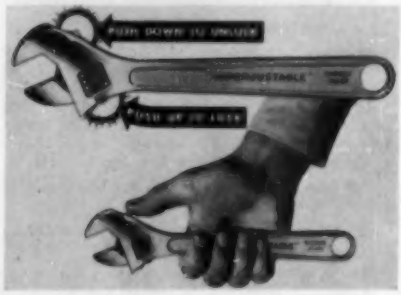
hole is required in wood, the blade cuts its own way through.

It has only three moving parts, an automatic air blast to keep cutting lines clear, and a removable handle which mounts far back on the housing, permitting an unobstructed view of the cutting line.

(For Convenience Circle Index Code 0606)

WILLIAMS INTRODUCES NEW LOCKING ADJUSTABLE WRENCH

The J. H. Williams & Company's new self-locking adjustable wrench fulfills all requirements. It has no clumsy or unsightly obstructions or protrusions. Fumbling is eliminated. Just a flick of the thumb or finger locks or



New Locking Adjustable Wrench

unlocks the adjustment instantly in any position.

These wrenches are drop-forged from selected alloy steel in 8-, 10-, and 12-in. sizes, ranging in capacity from 0 to 1 5/16 in.

These new locking adjustables are available at no extra cost.

(For Convenience Circle Index Code 0607)

NEW X-ACTO CLAMP TWEEZER

A small cross-action, self-closing combination clamp and tweezer is the latest addition to the X-Acto hobby tool line.

New X-Acto Clamp Tweezer

This new tool is an aid in every hobby, art, and craft which involves any grasping, holding, or gluing operation. It is especially useful in model building of all types, fly-tying, stamp collecting, jewelry making, Suji wire art, leathercraft, metalcraft, and other fields in which small parts play a role.

The clamp is 2¼ in. long and made of spring steel.

(For Convenience Circle Index Code 0608)

JOINTED STAINLESS STEEL RULE

A jointed stainless steel 2-ft. rule, which also serves as a protractor, has been introduced by the George Scherr Co., Inc.

This new tool is very practical and useful for mechanics and draftsmen to measure longitudinal as well as angular dimensions. The jointed rule has an accurate scale of chords engraved on one side from 0 to 120 advancing by half degrees and it is also provided with two center dots, one on each blade, by which when using a pair of ordinary dividers, the rule can be set to any desired angle, or vice versa, any angle can be determined. The Stainless rule has graduations reading in 1/8, 1/16, 1/32, and 1/64 in. The joint is provided with a spring tension which supplies sufficient friction to hold the angle setting rigid for scribing and layout work.

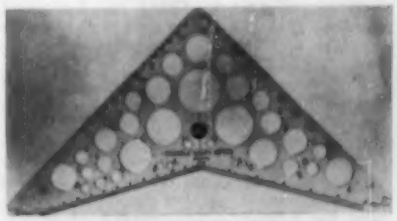
(For Convenience Circle Index Code 0609)

THE NEW ALVIN TRIANGLE-DRAFT METER

Alvin & Company has announced a new drawing instrument called the Alvin Triangle-Draft Meter, which is designed to save time, money, and effort.

This triangle-draft meter takes the place of seven practical drawing instruments: (1) large 10-in. 45/90-deg. triangle; (2) combined 30/60-deg. angle; (3) 10-in. fully graduated protractor; (4) accurate half scale in 32nds; (5)

(Continued on next page)



Alvin Triangle-Draft Meter

LAMINATING, CASTING AND MOLDING PROJECTS WITH LIQUID PLASTICS AND FIBERGLASS

Here are four classroom project kits featuring Castolite Liquid Plastic casting projects; Laminating with Castoglas — Fiberglass; Findings and embedding accessories for jewelry and novelty castings; Flexible mold making with Castomold, Castolite and related products.

MANY of you have been reading the series of articles by Anexander Bick of the Milwaukee Schools and Downer College, written for the December, 1954, through June, 1955, issues of this publication.

Liquid Plastics and Fiberglass Are "Natural" Projects for Wood and Metal Shops

Educational Shop Projects and the latest developments in Liquid Plastics and Fiberglass are published regularly in The CASTOLITER.

Everyone of the many projects which were described and illustrated in these articles from trays, bowls, tables and chairs to a full-size sail boat, was either combined with wood or metal or was formed over a wood or metal pattern. All projects were made by hand with simple tools and facilities available in even the smallest shop. The amazing thing about these modern materials are the professional results achieved by students and teachers who have never worked with fiberglass and liquid plastics before.

Complete Project Kits Help You Get Started

Three basic laminating, casting and molding project kits were assembled to simplify the initial step of getting started. These come in two sizes. The small kits are designed for teachers who first want to make their own experimental tests before introducing these new products to their students. The larger class project kits contain ample material for one or more entire shop classes.

Individual Castolite projects cost as little as 5c and up to around a dollar. It takes only small quantities of liquid plastic for embedding a mineral collection, for example, or assemblies of tiny electronic components for educational displays. At surprisingly little cost, truly distinctive jewelry and gift articles can be made. All of these and many other projects teach the student not only the technique of working these highly versatile materials, but at the same time he creates take-home objects of lasting value.

Illustrated Instructions Explain Basic Principles of Casting, Laminating and Molding

Please write for more details before requisitioning or purchasing any of the kits. A free copy of The CASTOLITER and our general price list and project kit folder will be sent to you by return mail. Incidentally, we will be glad to mail it to your home if you wish. Write to:

School Dept. G50,
The Castolite Co., Woodstock, Ill.

● **Producers and Distributors of Casting, Laminating, Coating and Molding Resins — Serving Industry, Science, the Arts and Crafts.**

SHOP EQUIPMENT NEWS

(Continued from previous page)

accurate full scale in 16ths; (6) convenient lettering guide; (7) complete handy circle template, with 33 circle guide from $\frac{3}{32}$ to $1\frac{1}{2}$ in.

The Alvin Triangle-Draft Meter is made of the highest quality Acrylic Vinyl Plastic, .075 thick. It is rigid, durable, extremely ductile and shatterproof. Its laminated graduations are sharp and clear and will not wear off. They lie close to any drawing surface thus avoiding the possibility of parallax lines. The instrument has a handy lifting center knob to permit easier manipulation; popular size parallel lettering guide spacers of $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, and $\frac{1}{4}$ in., and commonly used slant angles of 68 and 75 deg. for lettering.

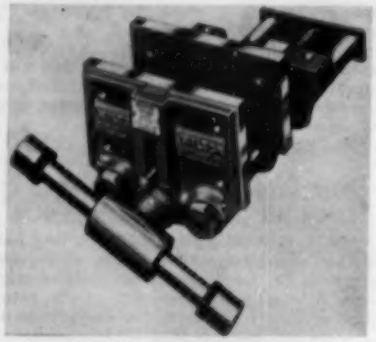
(For Convenience Circle Index Code 0610)

WILTON ANNOUNCES NEW LINE OF WOODWORKER VISES

A new line of woodworker's vises has just been announced by Wilton Tool Mfg. Co., Inc.

The new line of vises is available in 8 models, either continuous screw or rapid acting types. There has been no price increase, despite improvements in quality and sturdiness.

Rapid Titan models operate as two vises in one, since they change from free-sliding action to screw-lock action automatically. With the screw and nut engaged, tightening action can continue a complete turn or more; ordinary rapid acting woodworker's vises can be tightened only $\frac{1}{2}$ revolution (insufficient for many jobs).



Wilton Woodworker Vises

Reduced nut wear is another important feature of the new vises. Longer nut life comes from eliminating the vulnerable bronze half-nut, and using a malleable iron nut instead.

An exclusive *unconditional 3-year guarantee* protects all parts of these vises.

(For Convenience Circle Index Code 0611)

B & S MAGNICATOR FOR DIAL INDICATORS

The new testing stand announced recently by Brown & Sharpe offers some outstanding features of design and conveniences in use.

The Magnicator is equipped with a permanent magnet base of the same type as that used in other Brown & Sharpe Permanent Magnet Holding Tools. Magnetic force is fully releasing and turned *On* and *Off* by a push-button control which permits the Magnicator to be held and operated with one hand.

The Brown & Sharpe Magnicator

The Magnicator can be used on any magnetically conductive surface and in any position — upright, horizontal, or even upside down. It has three flat energized surfaces, the bottom of the base and the two sides. An additional V surface on the top of the base holds to round surfaces for making tests from spindle to table or from spindle to work.

The present design accommodates Brown & Sharpe Dial Attachment No. 725 in a range of .030 in. by .001 in. and No. 725A with a range of .008 by .0001 in. It can be used with other indicators as well.

The Magnicator is furnished in three different ways. (1) No. 742 without indicator, (2) No. 742-1 with a No. 725 Dial Attachment, and (3) No. 742-2 with a 725A Dial Attachment.

(For Convenience Circle Index Code 0612)

Fine Cabinet Lumber for Every School Project—by
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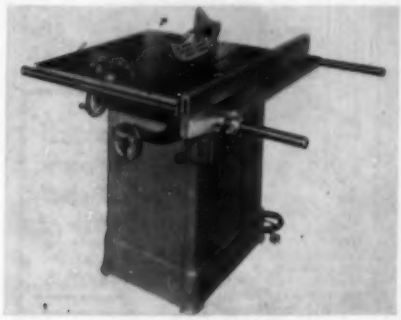
Dept. C, Joliet, Illinois

NEW DURO 10-IN. HEAVY DUTY TILTING ARBOR SAW

The Duro Manufacturing Company has announced a new addition to their expanding line of heavy duty power tools. It is a completely new 10-in. tilting arbor saw embodying the latest improvements and features plus many exclusive advantages not found on costlier machines.

It has been expressly designed to satisfy the basic needs of schools and industry for a rugged, safe, powerful saw. It is operated from



Heavy Duty Tilting Arbor Saw

any standard 1 or 1½ h.p. motor, the saw is driven by a three-groove arbor pulley with three perfectly matched V belts to utilize entire motor power output. Motor mounts directly beneath table surface, yet away from the sawdust stream. Heavy duty trunnions are extra rigid, extra strong, to provide continuous vibration-free operation.

(For Convenience Circle Index Code 0613)

NEW VEC FILMSTRIPS

Visual Education Consultants, Inc., have released several useful filmstrips, each carrying 25 frames, and each is provided with a supplementary teacher's manual.

One of these strips is the first of the VEC's New Safety Series. Its title is "Do You Know About Burns."

Another is titled "Meat and the Mississippi River." An interesting bit of information portrayed by this filmstrip is the fact that two thirds of our meat is raised west of the Mississippi River while two thirds of it is consumed on the east side of the river.

(For Convenience Circle Index Code 0614)

NEW CINCINNATI TRAY-TOP • ETTE

The Cincinnati Lathe and Tool Company has just perfected a basic, 12½-in. swing lathe which has the built-in accuracies and

(Continued on page 20A)

IMPORTED
CARVING
TOOLS IN SETS & SEPARATELY
FINEST GERMAN STEEL
Chisels, Gouges and Parting Tools Hardened and Tempered to hold sharp edge for lifetime service.
1001 Tools and Accessories.
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John A. McCarthy

Evaluates progress and lists the principles that have proved to be in harmony with America's best interests.

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☐ VOCATIONAL EDUCATION IN A DEMOCRACY 6.75

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Hotpack CONTROLLED TEMPERATURE KILN FOR ENAMELING ON COPPER

No. 7066

These units provide manual adjustment of temperature for kilns. They may be regulated so that current may be supplied to the kiln for any percentage of time per minute. This method of selection provides exact temperatures because the slightest movement of the control knob will vary the time of input, thereby raising or lowering the temperature as desired.

Model	Interior Size	Price F.O.B. Phila.
7069	12"x12"x5½"	$140.00
7066	8"x 8"x5½"	100.00

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Easy! Fun! FOR STUDENTS TO MAKE

REVOLVING FIXTURES

with the "pancake flat"

Lazy Susan BEARING

3", 6", 12" SIZES

ONLY 5/16" THICK!

Lazy Susan Coffee table

Lazy Susan cupboard shelves

Lazy Susan book case . . . plus many other uses

Making "lazy susan" trays, tables, cupboard shelves and other revolving surface fixtures is easy with Triangle's famous "Lazy Susan" bearing. All steel. Only 5/16" thick. Stamped, interlocked construction. One piece — no parts to lose. Large ball bearing race for maximum stability. Easily mounted with screws or adhesive. 3", 6", 12" sizes. Thousands in use! Satisfaction guaranteed!

Prices each: 3" size — $1.00; 6" — $1.60; 12"—$4.00. Quantity discounts for schools. Postage prepaid in U.S.A. when payment accompanies order.

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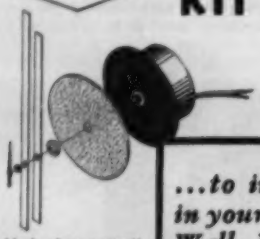
ULTRA-CRAFT CLOCK KIT . . .



Ideal shop project! Can be used as the "works" to be installed in classroom designed clock cases, pier cabinets or almost any case piece you might fashion in the arts department. Comes complete with electrical movement, 4" center disc, hands, dots, markers or numerals. Comes in black, aluminum or brass.

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M-2 LEATHER LACING GUIDE.... .31
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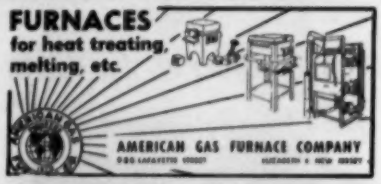

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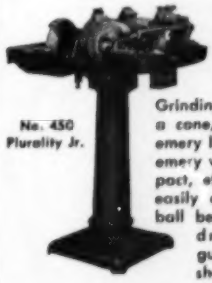

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42	48	614	620	626	632	638	644	650	656	661
43	49	615	621	627	633	639	645	651	657	662
44	610	616	622	628	634	640	646	652	658	663
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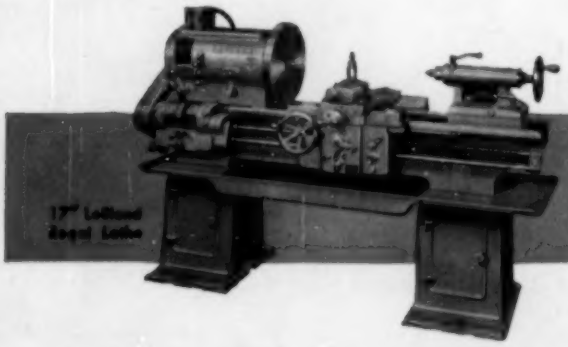

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